Designing Strategies for
**Water Supply Watershed Management**
in Nova Scotia

Nova Scotia Department of the Environment

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## The Nova Scotia Land Use Committee

The Nova Scotia Land Use Committee (LUC) was originally established by Order-in-Council on March 11th, 1976. The LUC is an interdepartmental committee that is responsible for consultation, information exchange, and the preparation of recommendations to government dealing with a broad scope of land use concerns that cut across numerous departments and agencies of the provincial government.

The committee operates on a three-tiered basis, with the top tier being comprised of deputy ministers drawn from 12 departments of the provincial government. The middle tier is a permanent working group of senior directors from all departments represented at the deputy ministers' level.

The bottom tier consists of technically oriented issues groups that are brought together to work out the technical aspects of issues and to prepare reports and recommendations for review and approval by the working group and the deputy ministers' committee.

One of those technical issues groups is the Water Resources Issue Group; and it is this particular sub-committee, under the chairmanship of the Department of the Environment, that has been responsible for the preparation of this watershed management handbook.

## Definition of a Watershed Management Strategy

The majority of contamination problems in a municipal water supply watershed can be prevented or avoided through land use management and planning that focus on water quality protection. This protection can be achieved through different mechanisms such as coordination among all levels of government, as well as among provincial departments in carrying out their activities, through municipal planning strategies and land use by-laws,and through the preparation of watershed management strategies. **A watershed management strategy coordinates a variety of approaches in managing the municipal water supply watershed including selective land acquisition, monitoring programs, and emergency response plans to spills.**

## The Purpose of the Handbook

A watershed can be defined as an area of land from which all surface water flow eventually collects in a common lake or stream. A watershed that is used to supply a public water system is called a water supply watershed.

Although this document focuses on the management of one watershed for a specific use, the relationship of that watershed to adjacent, upstream and downstream watersheds and to other uses should not be ignored. The watershed does not exist in isolation, and management decisions must recognize this.

This handbook has been written for those who may be both interested in and responsible for managing water supply watersheds, so that raw water quality is protected and a safe supply of domestic water is delivered to users.

Operating a municipal water supply is not a simple business. In Nova Scotia 16 municipal water supply distribution systems currently suffer water quantity limitations. Perhaps more importantly, 48 of the 56 surface water supplies, and 19 of the 25 groundwater supplies in the province have significant, identifiable, water quality problems. These problems may include colour, taste, odour, bacterial contamination, or metal contamination. Such problems increase the costs associated with water treatment and the potential risk to human health.

## The Intended Users

The handbook is a means towards the goal of putting in effect management strategies to protect water supply watersheds in Nova Scotia. It is a tool, which it is hoped, will be used co-operatively by governments, water utilities, citizens, and industry to develop management strategies that will recognize sustainable uses of the land within water supply watersheds while focusing on the protection of water quality as the primary objective.

Finally, the handbook serves as a standing offer of advisory services and assistance from the provincial government to all municipalities and water utilities that are responsible for ensuring adequate supplies of safe drinking water for the public.

Although there may be a broad range of uses for the handbook, including education or general public interest, it is directed primarily towards two key groups of people. The first group includes those who are in a position to authorize the development, adoption, and implementation of watershed management strategies: namely municipal councillors, water utility managers, and provincial government officials. Secondly, the handbook is directed towards those who will actually be responsible for steering the development of the watershed management strategy throughout the process from conception to adoption, implementation, and monitoring. These groups obviously have different mandates and require different information to carry them out. The handbook is structured to recognize these different needs.

## The Contents of the Handbook

The handbook is built around a simple series of steps that planners have used for many years in attempting to systematically arrive at sound conclusions concerning a land use or resource management problem. It is a sequence of steps that most human beings will consciously, or unconsciously, use many times in making decisions in life, particularly where multiple options must be weighed. These steps can be conceived of as a number of decisions organized into a logical sequence as illustrated on the right.

In developing a strategy for managing water supply watershed lands, this handbook advocates a process that essentially follows the same logic as outlined in the example.

The handbook provides an illustrated step-by-step guide through the process of developing options; evaluating options; selecting a preferred option; and ultimately, adopting, implementing, and monitoring the preferred option.

The handbook seeks to outline the roles of the various participants in the planning process, including municipal leaders; water utility personnel; the general public; provincial government; and private consultants. It provides details on the purpose that each step in the process is to serve; the key participants who must be involved in decision making at each step; the elements or activities involved in each step; and the products to be generated at each step in the process.

In essence the handbook is intended to serve as a step-by-step guide to developing water supply watershed management strategies.

| Steps | Illustration |
|---|---|
| **1.0** Identify the problem | "Thick blue smoke is belching from the tail pipe of my car!" |
| **2.0** Identify the issue | "My car may be breathing its last breath. People in the vicinity of my car may be breathing their last breath." |
| **3.0** Set the goal | "One way or another, the smoke must go!" |
| **4.0** Collect data | "How big is the problem? Can my car be fixed? What will be the cost of repairs? What is the cost of replacing my vehicle?" |
| **5.0** Evaluate alternative courses of action | "To fix or not to fix. Should I replace my vehicle? With what? What's the cost benefit of repair compared to replacement?" |
| **6.0** Select preferred option | "I'll bite the bullet and buy a brand new car." |
| **7.0** Adopt preferred option | "I get a loan to finance the new car." |
| **8.0** Implement preferred option | "I close the deal with friendly neighbourhood car dealership." |
| **9.0** Monitor | "To maintain the warranty, I return the car regularly to the dealer." |

## Using the Handbook

The handbook is designed to lead all users easily and informatively into the subject matter. PART I contains an annotated flow chart that outlines the overall process of developing a water supply watershed management strategy. The flowchart itself will provide some degree of understanding of the effort required. It will also provide an outline of the key steps involved in the process; suggestions on the appropriate stages for public input; and the critical stages at which major decisions will be required of councils and/or water utilities.

PART II is intended to serve as a detailed step-by-step guide to be followed in the process of developing the watershed management strategy to the stage where it can be considered for adoption and implementation.

PART III is a fictional example that illustrates each step in the process of developing a watershed management strategy. The illustration will serve as an even clearer indication of the levels of effort and associated costs that may be involved in preparing a watershed management strategy.

PARTS I AND III of the handbook should provide a general level of understanding of the process and enough information to assist with making a decision on whether or not to proceed with a planning exercise. If more detail is required, however, each step in the flowchart (PART I) and the illustration (PART III) is cross-referenced to the very detailed information contained in PART II.

The handbook is structured to provide users with the level of detail that each requires. Most users will find that PARTS I and III provide ample understanding of the overall nature of the process. It is likely however that only those directly involved in developing a management strategy will spend significant amounts of time on the detail of Part III.

If you require further assistance to interpret any part of the handbook, do not hesitate to contact the Nova Scotia Department of the Environment at the number listed below.

**Water Resources Branch**
**Nova Scotia Department**
**of the Environment**

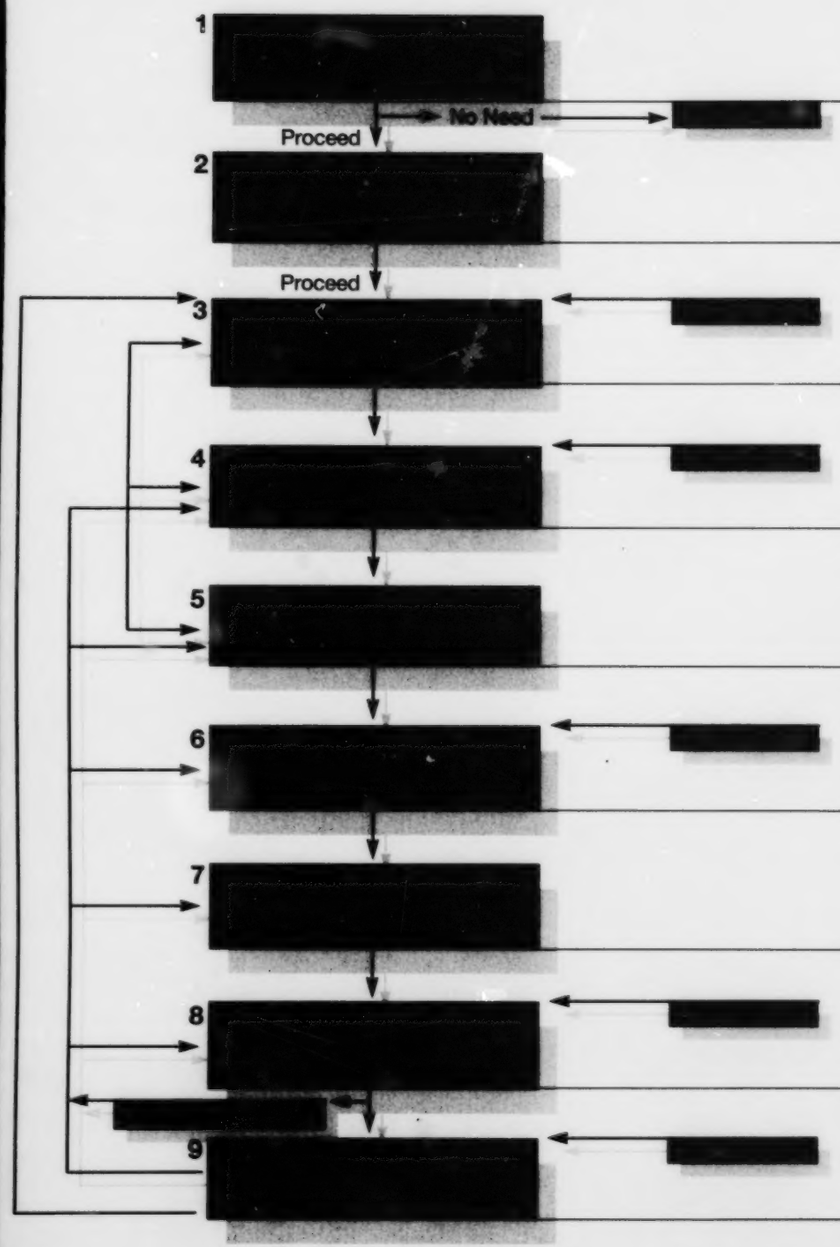
**PO Box 2107**
**5th Floor, Terminal Building**
**5151 Terminal Road,**
**Halifax, N.S.**
**B3J 3B7**

**Telephone (902) 424-5300**

# PART 1

## Developing Watershed Management Strategies: A Flow Chart of Procedures

## FLOW DIAGRAM OUTLINING PROCESS FOR DEVELOPING WATERSHED MANAGEMENT STRATEGIES




**Step one.** Identify the need for watershed management and determine the most appropriate level of management to aim for.
(See Part II, Section 1, and Part III, Section 2.)

**Step two.** Define the terms of reference for the study, and select members for the management team that will supervise the study.
(See Part II, Section 2, and Part III, Section 2.)

**Step three.** Identify, as broadly as possible, the full scope of concerns present in the watershed. This includes both existing and potential concerns.
(See Part II, Section 3, and Part III, Section 3.)

**Step four.** Set the ultimate goal to be achieved in the watershed through comprehensive watershed management planning.
(See Part II, Section 4, and Part III; Section 4.)

**Step five.** Ensure that all the necessary data required to develop the management strategy is available to the management team.
(See Part II, Section 5, and Part III, Section 5.)

**Step six.** Identify the management options that are available and match them to specific issues.
(See Part II, Section 6, and Part III, Section 6.)

**Step seven.** Bring the preferred management options (matched with specific issues) into an integrated[1], comprehensive[2] management strategy.
(See Part I, Section 7, and Part III, Section 7.)

**Step eight.** Officially adopt the comprehensive management strategy by a motion of the local municipal council(s) and endorsement of the strategy by the province.
(See Part II, Section 8, and Part III, Section 8.)

**Step nine.** Recognizing the dynamic nature of watersheds, set up procedures for continuous monitoring and updating of the management strategy.
(See Part II, Section 9, and Part II, Section 9.)

*1 "Integrated" implies that rather than adopting a piecemeal approach to management a more holistic approach is taken in which the individual components of a management plan are rationalized strategically within a framework.*

*2 "Comprehensive" implies that the approach to management seeks to deal with as broad and all-inclusive a range of issues and concerns as possible*

# PART 2

## Designing Water Supply Watershed Management Strategies: A Detailed Guide

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There is universal agreement that the protection of raw water quality is one of the best ways to ensure ongoing supplies of potable water. Treatment processes, on the other hand, are limited by economic, technological, and human constraints. Protecting the quality of raw water throughout a municipal water supply watershed depends therefore on the ability of a municipality to manage land use development in the watershed.

In addition to protecting water quality, there is a critical need to conserve and make the wisest and best possible use of the resource. Past practice in water supply management has relied heavily on subsidies. In addition the central water system has been used as an infrastructure incentive to promote regional economic growth. Canadians currently use more water and pay less for it than most other developed countries. Present and future practice necessitate the conservation of the resource through realistic pricing policies and the promotion of efficiency, not waste. Metering is the simplest proven means to control water use and improve efficiency. Education and water conservation technologies have also proven very effective in controlling water use.

A municipality or water utility (usually in co-operation with the province) has a number of options to draw on in order to protect water quality. These options include:

- Ownership of all, or at least the critical, lands within the watershed. Critical lands in general can be considered to be those adjacent to water bodies that

eventually lead into the stream or lake in which the intake for a water supply is located.

- Designation of the watershed as a protected water area under the Water Act, together with regulations controlling activities or development within the watershed.
- Land use policies under the Planning Act.
- Guidelines, regulations, or management plans controlling various resource activities (e.g., forestry, agriculture, mining).
- Guidelines or regulations for controlling construction and development practices.
- Treatment of raw water.
- Public involvement and education.

Each watershed in the province has a unique set of physical, social, and economic characteristics. It is unlikely that any one of the above management tools for water supply protection will individually be sufficient, particularly in a watershed with multiple land uses. If a management strategy is to be successful it must be responsive to the unique set of conditions in the watershed. A comprehensive approach to protection is required, in which some combination of these tools is incorporated into an integrated strategy tailored to the specific characteristics and needs of a particular watershed.

Developing a watershed management strategy requires the co-operation of all levels of government (and quite often more than one municipal government), the private sector, and individual citizens. This section of the handbook outlines the steps to be taken in the planning process, in terms of manpower and hard costs, as the issues become more clearly defined and the will to act (both politically and publicly) becomes firmly established. The process also allows previous steps or conclusions to be modified as circumstances and priorities change. The process can be exited at

numerous points along the way where it may be deemed inappropriate to proceed any further with strategy development. Significant progress can be made early in the process with minimal investment of manpower and money.

While the province has undertaken the responsibility of preparing this handbook, it will be the municipality or the water utility that in most cases will be responsible for developing, adopting, and implementing the watershed management strategy. Once a municipality has taken the initiative to manage its water supply area, the provincial government will commit itself to providing advisory services throughout all phases of the planning process including any need for advisory services related to ongoing monitoring and evaluation. Request for assistance from the government of Nova Scotia should be co-ordinated through the Water Resources Branch of the Department of the Environment at the following address:

Water Resources Branch
Nova Scotia Department of the Environment
PO Box 2107,
5th Floor, Terminal Building
5151 Terminal Road, Halifax,
Nova Scotia B3J 3B7 Phone: 424-5300

The process of developing a comprehensive watershed management strategy can be lengthy and will involve some direct cost to the municipality. From the outset every effort must be made to involve all stakeholders in the development of the strategy. Generating the public and political will to act is one of the first hurdles to cross and will serve as an early indicator of the probability of success in adopting and implementing the strategy.

## Overview of the Water Supply Watershed

### 1.1 Purpose

The overview of the water supply watershed identifies the need for land and water management in the watershed so that the quality of raw water is maintained at the highest level practical. The review should be undertaken with the following goals:

- To gather existing information, as required, to justify whether and how to proceed with developing a management strategy.
- To determine the most appropriate level of management.
- To initiate contact between councils where more than one municipality is involved.

### 1.2 Participants

The overview will generally be carried out in-house by a small group, including the municipal or water utility engineer, the municipal planner, possibly the building inspector or municipal clerk, and possibly one or more councillors. Assistance from the provincial government should be sought through the Water Resources Branch of the Department of the Environment.

In watersheds with complex issues such as multiple land use patterns or multiple jurisdictions, the expertise of a consultant with proven experience in watershed management may be desirable to assist with selected aspects of this overview.

### 1.3 Elements

#### GENERAL ANALYSIS

The overview analysis of the watershed must be comprehensive, including both physical aspects and human population concerns.

*Physical Considerations*

The level of management required in a watershed will be strongly influenced by the physical characteristics and conditions in the area. Such characteristics and conditions include:

- the extent of the watershed
- the variety and pattern of land uses (e.g., recreation, forestry, agriculture, urban development)
- the nature of the water supply (e.g., lake, stream, or groundwater)
- the capacity of the water supply on a continuing basis
- the existing level of treatment
- known, or reasonably suspected, concerns about water quality/quantity (e.g., sewage, siltation, colour, heavy metals), their location, and any baseline data available
- general resource characteristics (e.g., lands susceptible to erosion, soils, vegetative cover; sensitive wildlife areas; watercourses)
- transportation routes.

*Human Population Considerations*

Careful accounting of human population concerns will increase the probability that the

watershed management strategy will be successfully adopted and implemented. Such concerns might include:

- land ownership patterns
- sub-division activity, size of lots and trends
- population characteristics (e.g., urban vs. rural, location of water consumers relative to supply watershed, number of people serviced relative to number of people in supply watershed)
- demographics (Is the population increasing or shrinking? Are growth centres expanding or contracting?)
- age of population
- size of households
- services, present and future (e.g., existing or planned central sewer systems)
- building permit and development permit activities
- major employers
- user information (Does the water supply service industrial as well as domestic requirements?)
- number and type of dwellings
- inventory of existing controls (Is land use planning in effect? Has the watershed been designated under the Water Act?).

**PRELIMINARY ASSESSMENT**

A clear understanding of potential opportunities and constraints should emerge from the overview. This understanding should:

- provide direction for the level of management most appropriate to the watershed;
- provide early assessment of the likelihood of success.

**SELECTING THE APPROPRIATE MANAGEMENT APPROACH**

The approach to management will be directly dependent on the overview of the physical and socio-demographic considerations in the watershed. A variety of management approaches can be considered, including:

- regulatory (e.g., land use zoning; permitting requirements; fines)
- non-regulatory (e.g., stewardship; strategic location of services such as water, sewer, roads, and other municipal and provincial capital expenditures)
- incentives (e.g., tax deferral, tax exemption, etc.)
- conservation programs
- education (e.g., river guardians program)
- purchase of lands by the municipality or water utility.

As the study progresses the recommended management approach will likely develop into some combination of the tools listed above.

*Step One.*
*Overview.*

*Determine the most appropriate level of management to aim for.*

*Step One.*
*Overview.*

*Determine the most appropriate level of management to aim for.*

**1.4 Products**
The outcome of the overview will be a preliminary report that:

- provides a concise overview of current and anticipated conditions in the watershed;
- outlines a very clear set of recommendations to Council requiring a formal decision to proceed with the development of a watershed management strategy;
- provides rationale for further detailed study of the watershed if required.

**1.5 Further Action**
If Council decides to proceed at this point, the recommendations would be accepted in whole or in part, and they would go on to set up the management team.

## Organizing the Management Team

### 2.1 Purpose

The project management team steers the study process through to adoption and implementation. Here are some guidelines for determing the composition of the team and for setting the terms of reference for the team to follow.

### 2.2 Participants

Representation on this team will vary considerably, depending on the scope and nature of the need identified in the overview of the watershed.
Representation should reflect the jurisdictional makeup of the watershed. The watershed may cross the boundaries of two or more municipalities. In some cases the watershed may not even be within the boundaries of the municipality that it services.

The management team should have access to a pool of technical experts from within the provincial and federal governments, as well as funding assistance to retain additional expertise, if required (particularly to assist with data collection and analysis), through consulting contracts. The Water Resources Branch of the Department of the Environment will co-ordinate advisory services to municipalities wishing to plan watershed management.

Representatives should include councillors, municipal or water utility engineers, municipal planners, utility operators, members of the public at large, provincial government representatives, industry association representatives, special interest groups, and land owners in the watershed.

### 2.3 Elements

**GENERAL**

Representation, role definition, mandate, authority — all are critically important aspects of organizing the management team. A solid management team will significantly increase the probability of success.

The management team will not generally be responsible for technical aspects of developing the management strategy. They will, however, play a pivotal role in evaluation and decision making along the route towards the development and eventual adoption of the strategy by the municipal councils.

**DEFINING RESPONSIBILITIES OF THE MANAGEMENT TEAM**

In order to ensure that efficient progress is made towards the ultimate objectives of the planning process, the role and responsibilities of the management team must be clearly defined. If responsibilities are not clearly defined, false expectations may be raised and members may become frustrated over lack of progress. People will be disappointed when their expectations are not met.

Careful consideration must be given to the following questions when defining the roles and responsibilities of the management team:

*Step Two.*
*Establish Management Team.*

*Define the terms of reference for the study.*

*Step Two.*
*Establish Management Team.*

*Define the terms of reference for the study.*

- Who will define the terms of reference for the management team? Will the management team be given any flexibility to modify its terms of reference?
- What is the upper limit of decision-making authority for the management team? To whom are they ultimately responsible? Who makes the final decision about acceptance of a proposed plan? Reporting relationships must be clearly defined, indicating to whom, in what format, and how frequently, the management team will report.
- Will team members themselves be required to carry out much of the detailed, time-consuming data collection and data analysis? If so, will some form of compensation be available to offset travel costs or time away from normal employment?
- Are funds available for hiring outside assistance (e.g., consultants)? How are expenditures to be approved and accounted for?
- Who will provide the funds (i.e., the province, municipality)?
- What end products are to be provided through the management team? This must be clearly articulated in a precise statement.
- What is the role, if any, for the management team in the actual adoption and implementation process?

The internal working structure of the management team may be incorporated into its terms of reference. If not, however, the process for such things as appointing a chair or organizing sub-committees should be clearly laid out.

**APPOINTMENT OF MEMBERS**

Normally the body or bodies funding the management team's work will have the official responsibility for naming appointments.

### 2.4 Products

The outcome of this step of the process will be

- a list of members to be appointed to the management team.
- terms of reference that clearly define the roles and responsibilities of the management team.

### 2.5 Formal Approval

The team, and the manner in which it is structured, must be approved by the appropriate council or water utility. It may be necessary to obtain support from more than one municipal unit, depending on the location and extent of the watershed.

## Identifying the Issues

### 3.1 Purpose

At this stage the full scope of concerns present in the watershed are identified as broadly as possible. Although existing concerns will generally be of primary importance, potential concerns must also be considered. In some watersheds the potential concerns that could arise from future developments in the watershed may be most critical.

These existing and potential issues are categorized according to the criteria outlined in section 3.3 so that they can be addressed systematically. The plan can then be assessed in terms of its probability of success (i.e., that it will be adopted and implemented) from a political and economic perspective.

### 3.2 Participants

This step is carried out by the management team, with assistance from the Water Resources Branch of the Department of the Environment. The Water Resources Branch may be represented in an ex officio way on the management team, but their involvment will be restricted to advising the team on request.

In some watersheds with complex land use patterns, the team may find it advisable to retain the expertise of a consultant who has proven experience in watershed management and in municipal planning.

### 3.3 Elements

**EXISTING ISSUES AND CONCERNS**

It will be necessary to round out the detail about the issues identified in the overview analysis and to document additional issues that may not have been covered at earlier stages. All environmental, social, and political concerns should be fully documented.

A full and thorough analysis of the physical issues alone in the watershed will not be sufficient to guarantee the adoption and implementation of a watershed management strategy. Other important issues to identify include:

- the ratio and distribution of those benefiting from the water supply and those affected by controls in the watershed;
- some sense of whether there is a will to act or whether it could be fostered in the future;
- availability of human and financial resources.

Present pricing policy subsidizes the water user, who does not pay for the true value of the resource. Since studies have shown that low water rates lead to waste, efficient use will not be achieved until this group pays a realistic price and learns to value the resource. Moreover, equity will not exist between the providers of water, who are required by regulations to protect the resource, and the users, who have no incentive to moderate their behaviour. Realistic funding structures also provide the necessary

*Step Three.*
*Identifying Issues, Constraints, and Opportunities.*

*Identify as broadly as possible the full scope of concerns present in the watershed.*

*Step Three.*
*Identifying Issues, Constraints, and Opportunities.*

*Identify as broadly as possible the full scope of concerns present in the watershed.*

capital funds to acquire sensitive lands and to repair, modernize, and build water distribution and treatment systems.

Early indicators of some complications that might be encountered, especially in the adoption and implementation phases of the planning process, include:

- involvement of more than one municipality;
- strength of commitment of those who must adopt the strategy;
- concerns about enforcement.

**INFORMATION REQUIREMENTS**

Issue identification should be comprehensive, and questionnaires may be an appropriate means to identify concerns. The use of professional expertise, balanced with local public input, will be essential. The complexity of issues and the degree of effort required to define them will vary depending on the nature of the watershed in question.

All the issues will not come to light at the same time in the study process. Some information may have to be processed with incomplete data. The planning process must be flexible enough to allow for the input and incorporation of new data.

**POTENTIAL ISSUES AND CONCERNS**

Potential changes that might generate new issues in the watershed must be anticipated. The objective at this stage is to forecast developments in the watershed based on the following factors:

- current activities;
- historic trends;
- activities taking place in areas adjacent to the watershed;
- activities taking place elsewhere in the province.

If critical changes are anticipated, the watershed strategy has a better chance for long-term success.

**PRIORITIZATION OF ISSUES AND CONCERNS**

Some of the issues identified may be of little consequence. Others may be impossible to deal with for technological, economic, or political reasons. Many will be serious but amenable to resolution. The bottom line is that the resources, the will, and the technology will not be available to deal with every issue. Furthermore, those issues that are amenable to solution cannot be dealt with all at once.

In view of the above, the comprehensive list of issues will have to be prioritized in accordance with a prescribed set of criteria. These criteria should include:

- magnitude of the risk involved in a particular concern or issue;
- scale of the problem (widespread or local);
- nature of the risk (health, aesthetic, industrial);
- availability of remedial, mitigative, or preventative measures;
- responsiveness of issue to

remedial, mitigative, or preventative measures (in other words can impacts be repaired, managed along the way, or headed off entirely);

- cost/benefits
- will to act.

Issues that involve high risk to human health and that are amenable to remedial, mitigative or preventative measures will be identified as priority issues to be dealt with first.

It may be that some risks will eliminate a supply as a source of potable water if the risk to human health is high, but cannot be remedied. Low-risk issues (or those that affect only the industrial use of water) that will not respond to any known remedial, mitigative, or preventative measures will be classified as residual or lower priority issues. Such issues will be dealt with only as the priority issues are resolved.

Some issues may never be addressed because of resource constraints, minimal risk, or lack of political and public commitment.

**3.4 Public Workshops Round 1**
At this stage an initial round of public workshops should be held to provide an opportunity for land owners to identify and help set priorities on critical issues.

**3.5 Products**
As a result of this stage of the process, the management team will have:

- a complete listing of all identified issues, existing and potential;
- a selective, annotated listing of existing and potential issues prioritized in the order in which they are to be addressed.

*Step Three.*
*Identifying Issues, Constraints, and Opportunities.*

*Identify as broadly as possible the full scope of concerns present in the watershed.*

## Setting Goals and Objectives for the Watershed

*Step Four.*
*Setting Goals and Objectives for the Watershed.*

*Set the ultimate goal to be achieved in the watershed through comprehensive watershed management planning.*

### 4.1 Purpose

In this step, the managememt team will set the ultimate goal to be achieved in the watershed through comprehensive watershed management planning.

### 4.2 Participants

The project management team, with assistance from the provincial government through the Water Resources Branch of the Department of the Environment, will set the goals and objectives for the watershed.

### 4.3 Elements

#### SETTING THE GOALS

The goal of a watershed management strategy will ultimately determine the approach taken in the planning process, so setting the goal is critical to the success of the strategy.

If the goal is exclusively to protect water quality, the planning process becomes relatively simple. However, in most cases it will be impossible to make the protection of water quality the sole goal.

The goal statement, while recognizing the priority consideration being given to water quality, must also take into consideration important sub-priorities such as ongoing agricultural and forestry activities. In many watersheds in Nova Scotia provision will likely be required for some form of urban development. This means that agricultural development strategies, forest management strategies, and urban planning strategies will have to be integrated into a comprehensive watershed management strategy that recognizes maintenance of water quality as the first priority, and other land use activities as secondary or lesser priorities.

#### SETTING OBJECTIVES

The goal must be broken down into well-defined, achievable objectives, which are consistent with the goal, and against which progress can be readily measured.

Objectives are formulated around the prioritized list of issues identified in the last step. Such objectives might include:

- the control of targeted noxious substances in water (e.g., fecal coliform, nitrates, or sediment);
- the phasing-out of certain activities in the watershed that are unacceptable to the goal of maintaining water quality (e.g., land fill site);
- the phased purchase of critical lands adjacent to the terminal water supply and major tributary streams.

#### ESTABLISHING THE PROCESS

Stating the goal and setting detailed objectives can be likened to identifying the pieces of a jigsaw puzzle. Arranging the pieces of the jigsaw puzzle into a meaningful picture is a good illustration of designing a procedure to achieve the objectives and ultimate goal of the strategy.

Objectives must be addressed systematically, since success in meeting some will depend on previous success in meeting others.

Establishing the process focuses on defining the path by which the management team will guide the development of the watershed strategy from conception to adoption and implementation. In designing this pathway provision must be made in for such things as:

- public consultation
- distribution of public information
- public education
- collection of data
- critical points of evaluation and decision making
- reporting arrangements for council/water utility
- opportunities for feedback loops and flexibility for modifications to goals and objectives
- time line with clearly identified milestone objectives against which progress can be measured
- co-ordination of all aspects of the study to ensure efficiency
- consultant studies/staff studies and any special financial assistance in support of such studies.

**4.4 Public Workshops Round 2**
The second round of public workshops will provide an opportunity for public involvement in setting the overall management goal for the watershed. This will be critical to building grass-roots support.

**4.5 Products**
The outcome of the process will be a clear statement of the goals and objectives to be addressed by the watershed management strategy and a plan for developing this strategy.

*Step Four.*
*Setting Goals and Objectives for the Watershed.*

*Set the ultimate goal to be achieved in the watershed through comprehensive watershed management planning.*

## Collecting Additional Data

*Step Five:*
*Collecting Additional Data.*

*Ensure that all the necessary data required to develop the management strategy is available to the management team.*

### 5.1 Purpose

Once the goals and objectives have been set, the management team can identify what additional data is required to develop the management strategy. To control costs data collection and compilation should be tailored to exactly what is required: no less and no more.

### 5.2 Participants

The management team, consultants, and the provincial government will carry out the collection of additonal data. Provincial government assistance in data collection could conceivably come through a number of departments but would be coordinated by the Water Resources Branch of the Department of the Environment.

### 5.3 Elements

Data collection (e.g., biophysical land classification; water quality data) can be an expensive procedure, particularly if it involves new data. For this reason, extensive effort in data collection and data compilation should be carried out only after the level of (and approach to) planning has been determined and the goals and objectives have been clearly defined and agreed to. This procedure will go a long way to avoiding expensive redundancies in data collection while ensuring that no critical gaps in data requirements remain unfilled.

**PHASE ONE**

The available data collected during the overview is reviewed in terms of its adequacy to address the list of prioritized issues and objectives.

**PHASE TWO**

Data deficiencies exist that preclude the successful analysis of the prioritized issues and achievement of objectives are identified.

**PHASE THREE**

Collection of additional data is prioritized and based strictly on need. New data collection should be avoided wherever possible to take advantage of existing data sets. Data collection exercises should be carefully designed to meet the needs identified and should be monitored for consistency and accuracy.

Technical assistance and advice may be required from government agencies or the private sector at this point. Costs for data collection should be established and the value of the data reviewed against those costs, before the work is undertaken.

### 5.4 Products

Technical reports resulting from the process will summarize and provide pertinent interpretations of data collected.

## Evaluating Options

### 6.1 Purpose
Available management options are identified and matched to specific issues. This stage represents the first major step in synthesis, analysis, and evaluation in the preparation of the strategy.

### 6.2 Participants
The management team will carry out the evaluation with consultants and assistance, if required, from the provincial government through the Water Resources Branch of the Department of the Environment.

### 6.3 Elements
There are three critical steps involved in issue evaluation.

#### ASSESSING PRIORITY ISSUES
Priority issues should be assessed on the basis of all the available data. Full description of the issue, its impact on water resources, and consequences of dealing with it should be provided in this assessment. Consequences should include social and political impacts: for example, restrictive controls on logging practices may affect employment or may result in certain practices no longer being permitted on certain properties.

#### IDENTIFYING AVAILABLE MANAGEMENT OPTIONS
Available management options should be identified for each of the issues assessed. A range of options may be available in some cases. For example, regulatory controls may be posssible under a variety of legislation, including the Planning Act, the Water Act, the Nova Scotia Pesticide Products Control Act, etc.

In other cases, the options may be limited or give only partial satisfaction. A number of management strategies may have to be combined within the overall plan to provide for complete control over a particular issue. For example, the land use controls under the Planning Act may provide effective control over development in a watershed but inadequate control over land use activities such as forestry. Combinations of regulatory options will frequently be necessary. Other regulatory mechanisms may be required.

Provision should also be made to consider innovative solutions that more adequately meet a local need or have to be created due to lack of other options.

The Appendix outlines a range of legislative and regulatory options that can be applied to control watershed issues.

#### MATCHING MANAGEMENT OPTIONS TO ISSUES
Evaluation and selection of the preferred management options that will be matched to specific issues should be based on the following criteria:

- appropriateness/effectiveness
- compatibility with other options
- cost of implementation/capital
- ongoing costs
- financing options

*Step Six.*
*Evaluate Options.*

*Identify the management options that are available and match them to specific issues.*

*Step Six.*
*Evaluate Options.*

*Identify the management options that are available and match them to specific issues.*

- realistic pricing
- ease of implementation
- public acceptance
- legal considerations.

**6.4 Public Workshops Round 3**
The suggested third round of input will make provision for public input to the process of evaluating which options (or combinations of options) are most appropriate in dealing with specific issues and concerns.

**6.5 Products**
As a result of the evaluation, the components of a management strategy will be in place in the form of issues paired with proposals to eliminate, mitigate, or control existing or potential problems.

## Preparing the Management Strategy

### 7.1 Purpose

The preferred management options (matched with specific issues in the watershed) are now brought into an integrated, comprehensive management strategy that can go forward for adoption and implementation. This includes ensuring that adequate authority exists and the appropriate legislative vehicles are available for eventual implementation.

### 7.2 Participants

The management team and consultant participate in preparing the strategy.

### 7.3 Elements

At this stage in the planning process the preferred management options dealing with the individual prioritized issues are brought together for detailed review and analysis. Everything up to this point has been part of establishing a solid foundation upon which to begin building a comprehensive management strategy. If steps one through six of this handbook can be considered to lay the footings and foundation, the remaining sections of the handbook deal with building the superstructure above the foundation.

The strategy should seek to incorporate the following characteristics:

- It should be relatively straightforward and readily understood by those who will have to implement it and those whose lives will be affected by it.
- It should be systematic in its approach and designed to yield the same end result regardless of the make-up and configuration of the implementing team.
- It should be comprehensive, covering as broad a range of the issues identified as economically and technically reasonable.
- It should be cost effective.
- It should incorporate an appropriate balance between expert opinion and public aspiration.
- It should be legally enforceable.
- It should be flexible enough to accommodate review and modification if changing circumstances and priorities warrant.

In general, this stage in the planning process can be considered to involve identification and resolution of trade-offs, development of an overall strategy, and scheduling of implementation phases.

### 7.4 Products

The proposed management strategy is now ready for presentation to council for adoption by the municipality. Recognition and endorsement by the province will be necessary to ensure that the watershed management strategy complies with provincial programs and polcies.

*Step Seven.*
*Prepare the Management Strategy.*

*Bring the preferred management options (matched with specific issues) into an integrated, comprehensive management strategy.*

## Adopting the Watershed Management Strategy

*Step Eight.*
*Adopt the Watershed Management.*

*Officially adopt the comprehensive management strategy by a motion of the local municipal council(s) and endorsement of the strategy by the province.*

### 8.1 Purpose

The management strategy must be adopted formally as policy by the municipal authorities and recognized or endorsed by the province. This formal adoption will realize the following objectives:

- to ensure that the strategy is used to guide government policies, programs, and approvals potentially affecting the watershed.
- to ensure that adequate authority exists to implement the strategy. The tools necessary to implement the strategy will have already been determined. Formal adoption will establish the authority to permit these tools to be applied in the watershed as part of a management package.
- to ensure that adequate human and financial resources are available to implement the strategy.
- to co-ordinate the various components.

### 8.2 Participants

The municipality, the water utility, and the provincial government are involved in adopting the strategy.

### 8.3 Elements

A list should be made of all the policy and legislative mechanisms to be used in managing the watershed, (e.g., forest management plan, municipal planning strategy, and land use by law). There should also be an outline of municipal and provincial procedures to be followed to adopt the strategy as a whole, and to adopt specific components. For example, council may adopt the management strategy through a motion of the committee of the whole. However any intermunicipal planning strategy or land use by-law component of the strategy must be advertised, subject to public participation and review, in addition to receiving council's approval and approval of the Minister of Municipal Affairs. Equally, designation under the Water Act requires surveys to be completed and approval by the Minister of the Environment.

A timetable should be drawn up to show the sequence of adoption procedures to be followed based on priority needs and phasing-in of the strategy.

### 8.4 Products

Formal adoption will result in:

- the adopted strategy
- a step-by-step procedure outlining the sequence of activities necessary to ensure the orderly and co-ordinated implementation of the adopted watershed management strategy and the time frame in which this will take place.

## Implementing and Monitoring the Strategy

### 9.1 Purpose

After formal adoption of the strategy, it must be implemented and monitored.

Implemention involves the following:

- making changes to existing administrative procedures or adding new procedures as necessary to put the policy into effect;
- delegating authority and assigning roles/responsibility (e.g., to enforce regulation by-laws);
- providing the human and financial resources necessary to implement the adopted watershed management strategy.

### 9.2 Participants

Responsibility for implementing and monitoring the strategy is shared by council, the water utility, the provincial government, and land owners.

### 9.3 Elements

The procedure for implementing and monitoring the strategy includes the following actions:

- Draw up a list of the regulations/permits/approvals required as a result of adopting the watershed management strategy.
- Determine the need for modifying activity for various departments/agencies of the provincial government and the affected municipalities as a result of the strategy.
- Establish formal procedures to ensure that approvals are carried out in a co-ordinated and efficient manner: for example, consider establishing a "one-window" approach to issuing permits/approvals with all initial contact being carried out by one municipal official at one location.
- establish procedures for enforcement of regulatory components of the strategy and clarify jurisdictions.

### 9.4 Products

A concise outline should be drawn up to show how the individual agencies involved in managing the watershed will co-ordinate their activities and the procedures that will be followed to ensure that the requirements of the management plan are met.

A formalized cyclical review process should be put in place to monitor performance of the strategy and ensure that the strategy is regularly updated so that it remains current with changing conditions and priorities in the watershed.

*Step Nine.*
*Implement and Monitor.*

*Set up procedures for continuous monitoring and updating of the management strategy.*

# PART 3

## Developing a Watershed Management Strategy: An Illustrated Example

This is a fictional example and is designed for illustrative purposes only. As a result, only a limited number of the many potential issues are touched upon.

Readers should bear in mind that actual issues, goals, strategies, and costs will vary from one water supply watershed to the next.

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On March 13th, 1994 the Municipalities of Frontenac and Cumerbund passed separate motions in Council to adopt the Neil River Watershed Management Strategy in order to protect the water supply of the Village of Urbanville, which is situated within the Municipality of Frontenac.

An outline of the conditions under which the strategy was developed, together with actual details of the strategy, are presented in the following discussion.

## Overview

*Step One*
*Overview*

*Identify the need for watershed management*

The first step in the process of developing a management strategy for the Neil River Watershed was to prepare a broad overview of the current status of issues and concerns relative to the protection of the water supply. This overview of issues and concerns, initiated by the municipal planner and the municipal engineer, was designed to establish the need for planning and set the preliminary direction for the process of developing a management strategy for the Neil River Watershed.

## General

The Village of Urbanville (in the Municipality of Frontenac), which draws its water supply from the Neil River, is situated at the mouth of the Neil River where it empties into the Gulf of St. Lawrence. It was originally established as an Acadian community and, following the Acadian expulsion in 1755, was repopulated by German and Scottish settlers. The Village Commission was established in 1855. At that time a combination of agriculture and lumbering were the primary economic activities. The lumbering industry was primarily in support of the shipbuilding industry; 261 ships were built in the area during the 19th century.

With the decline in the shipbuilding industry at the turn of the century, Urbanville became primarily an agricultural service centre in the area. By the mid-20th century, the village had grown to a population of approximately 580 people with 140 single detached dwelling units, 25 commercial establishments, a fire hall, a post office, and a motel. All were dependent on individual wells, and both the quality and quantity of groundwater were considered inadequate for existing needs and were a limitation to development in the village. An alternative source of water supply was required in order to eliminate the need for rationing water use during dry periods and the persistent problems also associated with odour and taste. The Neil River offered the only alternative.

## Physical Characteristics

In 1975, a design was completed and construction started on the physical infrastructure for the water utility. Water drawn through the gravel of an infiltration gallery in the bed of the Neil River was used to supply the system. This utility has functioned to the present time but has been under continuous pressure from the threat of pollution affecting water quality in the watershed.

### General Characteristics of the Watershed

The Neil River Watershed may be most vividly described as consisting of the Highlands and the Lowlands in roughly equal proportions (see Figure I). Most of the watershed is located in Frontenac County, but approximately 16 km$^2$ of the upper reaches of the watershed are located in Cumerbund County.

The Highlands, in the south, start at elevations of 300 m to 335 m and slope northward to elevations in the 60 m range. This area is largely covered by forest (see Figure II) and contains several small lakes, which form the headwaters of the Neil River. The largest lakes include Carter's Lake, Pickerel Lake, Pine Lake, and Square Lake. Pine Lake has experienced a small amount of cottage development. Killam Mountain is the prominent high point in this area.

The Lowlands are an area of gently rolling topography with elevations ranging from 30 m to 60 m and are situated north of the Highlands. The Lowlands are covered with soil having high agricultural capability in the Canada Land Inventory (CLI) Class II and III categories (see Figure III). Based on soil capability, the potential for increased agricultural activity in this area is significant. The vast majority of the Lowlands, however, is also forested (see Figure II). Major roads occur mostly in the Lowlands, with several gravel and woods roads extending south into the northern portion of the Highlands.

The Neil River flows in a north and northeasterly direction, draining a watershed area of more than 80 km$^2$. The two primary tributaries of the Neil River are the Raleigh Mill Brook and the Rill Brook. Stream discharges have been estimated at a minimum of 0.4 m$^3$ per second. This minimum flow will satisfy a demand of 9 million litres/day, well in excess of the demand in the village. Even during the longest summer dry spells, the river system has provided a reduced but continuous flow of water. Water quality problems have been present but have been handled effectively during the 15-year life of the utility.

The most persistent quality problems experienced have been due to colour and high turbidity, during periods of high runoff. Under normal flow, the Neil River water has a low sediment loading, which existing treatment facilities can handle. Heavy rainfall can change all this

*Step One.*
*Overview.*

*Identify the need for watershed management.*

*Step One.*
*Overview.*

*Identify the need for watershed management.*

with sediment loadings becoming excessive. As a result, as little water as possible is pumped from the river under high flow conditions, which occur during spring runoff or following heavy rainfalls.

**Land Use Characteristics**

The predominant land uses in the Neil River watershed are forestry and agriculture, but of the 500 employed people living in the watershed only 105, or 21 per cent, work in these particular resource sectors.

**FORESTRY**

Large clearcut operations have been under way near Killam Mountain and Square Lake in recent years. Similar operations have been carried out in the last decade, and almost all of them are located in areas with few stream courses nearby. There appears therefore to be minimal chance for increased sediment load in streams as a result of these forestry operations. Pesticides are used as a forest management tool in the watershed, but no residues have been found in the water supply.

The potential for increased forestry activity in the area is significant. The large landholders include the provincial government and the Royale Paper Company. Most of the forested land is in private ownership with the majority of the holdings being small to moderately sized. Many of these holdings are managed as part of a woodlot association.

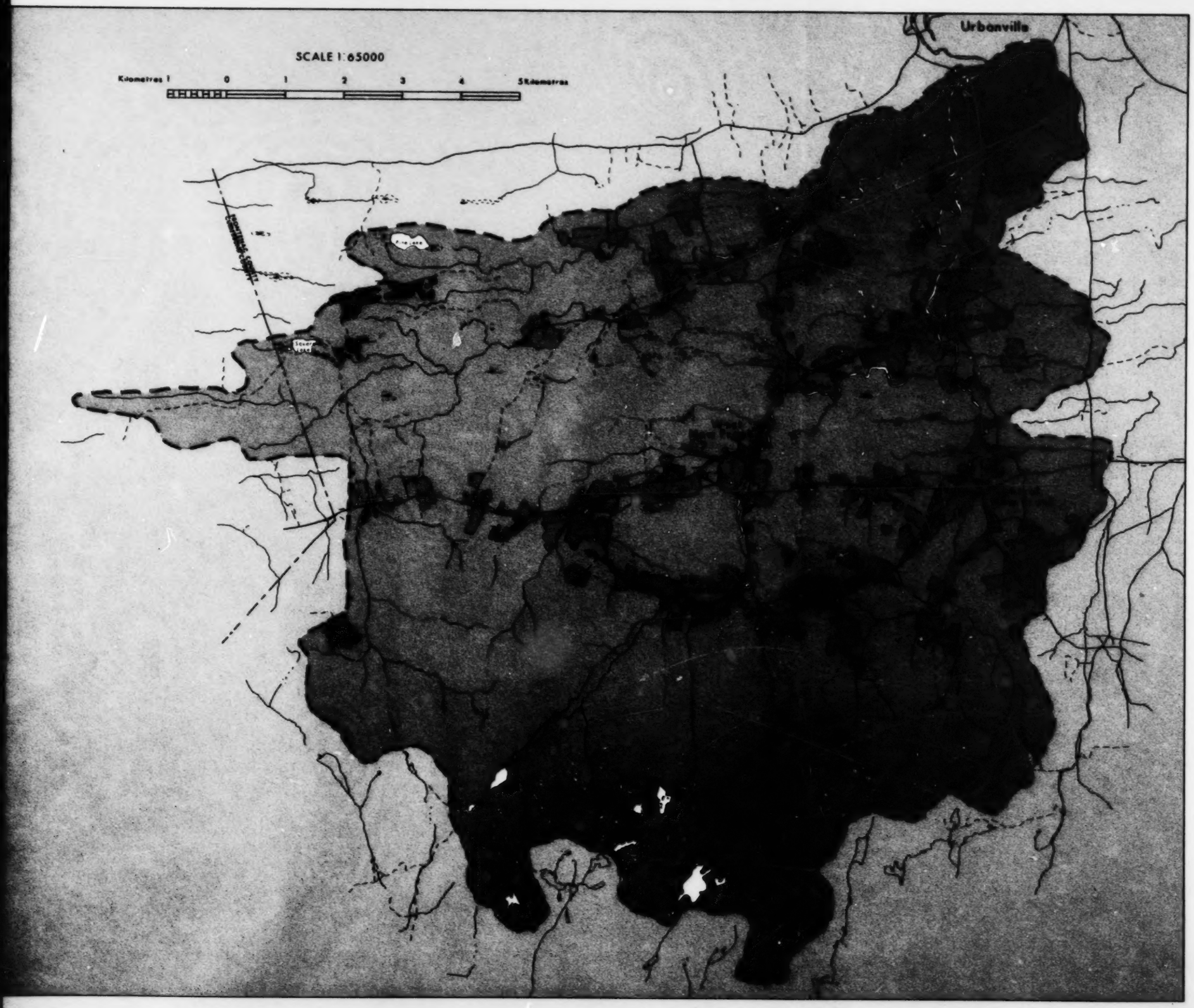
Industrial activity in the watershed is limited to the existence of eight sawmills. All of these sawmills produce less than 1,000,000 board feet of lumber per year. The growth of more or larger sawmills in the area could be stimulated by a general growth in the forest industry.

**AGRICULTURE**

The agricultural activity in the watershed consists of hay and grain crops with some small areas of horticultural crops and orchards. Livestock grazing is also quite evident on a small scale throughout the watershed. Within the past few decades, agricultural output from the area has decreased, and significant amounts of land have been taken out of production or abandoned. There is limited storage and use of agricultural pesticides in association with this activity. No residues from these substances have been found in the water supply. Current agricultural activity does not appear to be concentrated near surface watercourses. Based on soil capability alone, there is substantial potential for increased agricultural activity in the watershed in the future.

**MINERAL RESOURCES**

Mineral extraction in the area of the watershed is limited to small sand and gravel quarries. Several abandoned gravel pits within the watershed are also small in size. The potential for future mineral extraction is limited, as the area is generally not considered to have large quantities of commercially viable minerals.



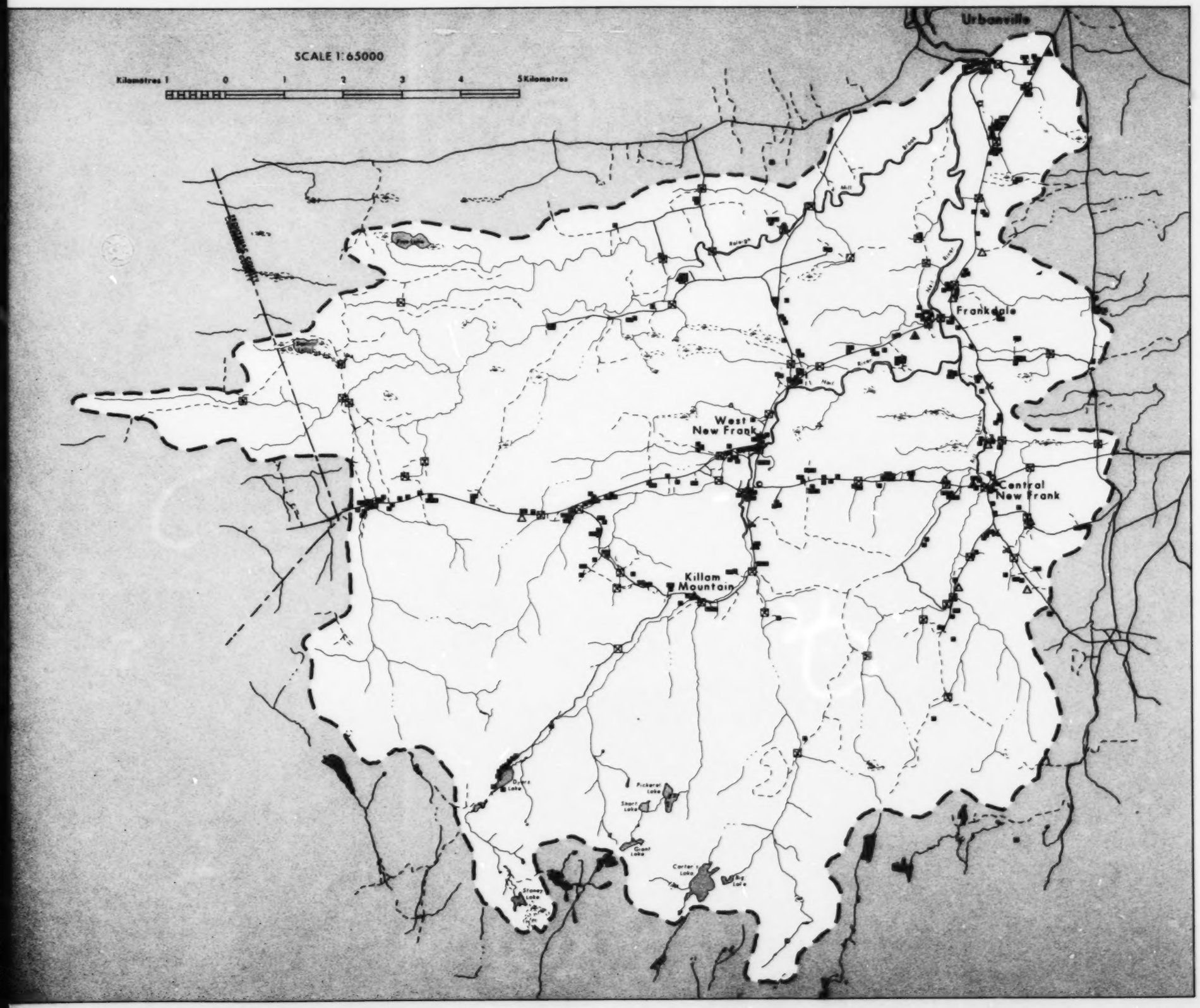

Surface Water Supply Watershed
for the **Village of Urbanville** 1991

**Land Use**

- Active Agriculture
- Industrial, Commercial, or Institutional
- Cleared Forest
- Recent/Current Forestry Operation
- Forested Area

**Source**
Derived from Agricultural Land Use Information Series, N. S. Department of Municipal Affairs. Supplemented and updated from aerial photography and field checks.

**Base**
Derived from 1:10000 Land Registration and Information Service (LRIS) Orthophoto map series. Updated from aerial photography and field checks.




Surface Water Supply Watershed for the **Village of Urbanville** 1991

**Base Information**

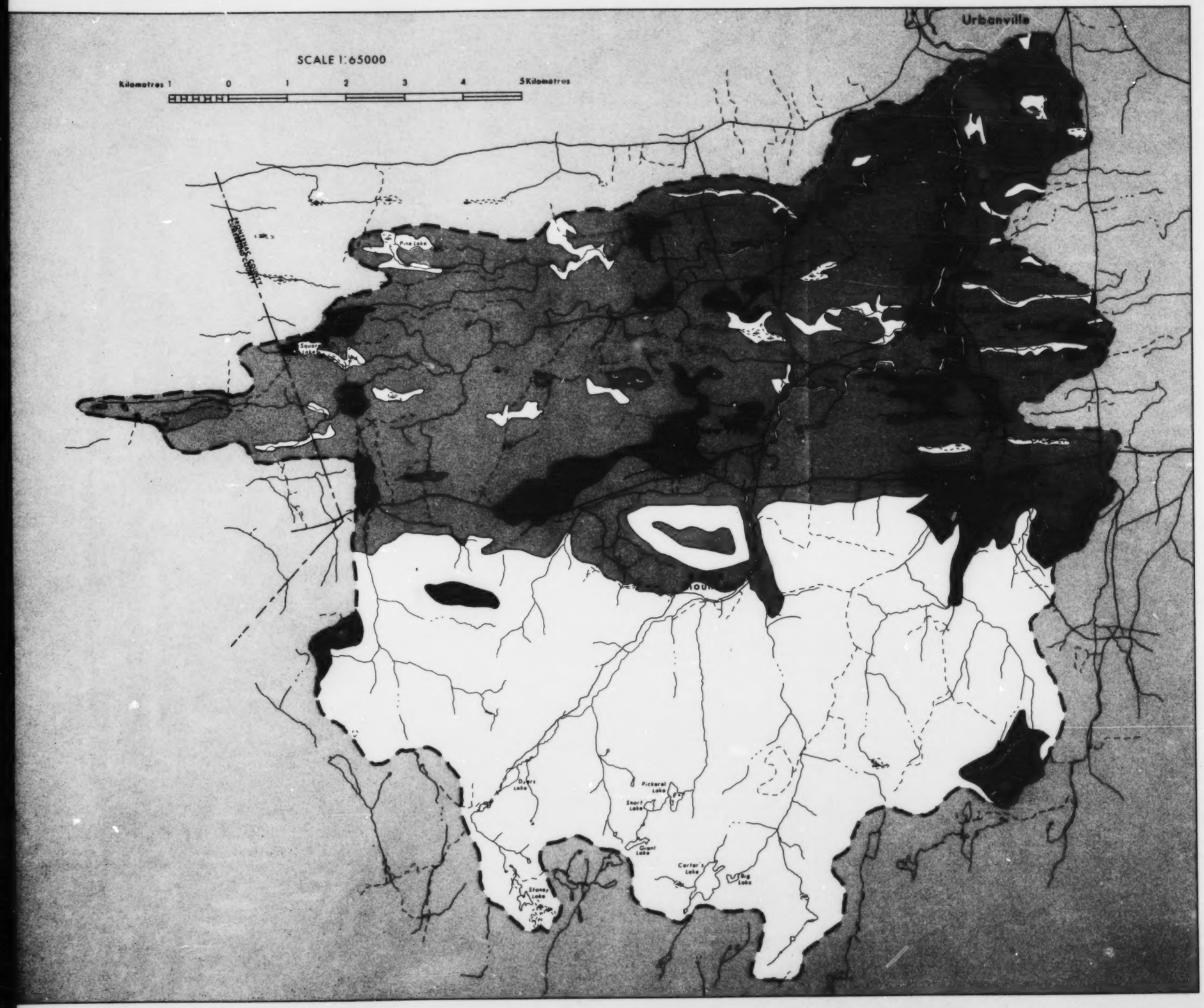
- Paved Roads
- Loose Surface Roads
- Cart Track / Trail
- County Boundary
- Intermittent Stream
- Shoreline
- River / Stream
- Swamp
- Watershed Boundary

**Settlement Information**

- Residence
- Barn
- Industry
- Commercial
- Institution
- Pit/Quarry
- Cemetery
- Pumping Station
- Watercourse Crossing

**Settlement Information**
Derived from Settlement Survey Database, N.S. Department of Municipal Affairs, updated from aerial photography and field checks

**Base**
Derived from 1:10000 Land Registration and Information Service (LRIS) Orthophoto map series. Updated from aerial photography and field checks.




Surface Water Supply Watershed for the **Village of Urbanville** 1991

**CLI Agricultural Capability**

| | |
|---|---|
| Class 1 | suitable for sustained cultivation of a wide variety of crops |
| Class 2 | |
| Class 3 | |
| Class 4 | some capability for cultivation but mainly suited to forage and improved pasture |
| Class 5 | |
| Class 6 | native pasture |
| Class 7 | non-agricultural |

**CLI**
Canada Land Inventory, Soil Suitability for Agriculture Classification System. Seven-class system ranked in descending order of suitability from 1 to 7.

**Source**
Department of the Environment 1972. The Canada Land Inventory Soil capability classification for agriculture Rep No 2.

**Base**
Derived from 1:10000 Land Registration and Information Service (LRIS) Orthophoto map series. Updated from aerial photography and field checks.

### RECREATIONAL ACTIVITIES

Recreational land use is currently limited to a few cottages scattered throughout the watershed. The possibility for growth appears quite good, as there are some lakes in the watershed area. Pine Lake, in the southern portion of the watershed, appears to have the greatest possibility for recreational development as it currently has road access.

Hunting and fishing are popular activities in the watershed and fluctuate in intensity seasonally. Some problems have been noticed with the use of all-terrain vehicles (ATVs), but none of these were noted to be affecting water quality.

### Existing Water Supply System

The infiltration gallery in the Neil River supplies water to two pumps: one located in a wet well and the other in the pump house on Juniper Road. Before going to the distribution system, the water passes through a rapid sand filter, it is chlorinated, and the pH is adjusted on a regular basis.

A water main, 3 600 metres in length, delivers the water to a 750 000-litre elevated steel standpipe reservoir, which in turn feeds 6 200 metres of distribution main. Roughly 285 customers, 165 of whom live within the village proper, are connected to this system and receive fire protection from 89 fire hydrants. The remaining customers are all located on the outskirts of the village.

The utility pumps 84 000 000 litres per year or 228 000 litres per day with all water services being metered.

The water-rate structure for the Village of Urbanville water supply includes a base, or minimum charge. A consumption rate is added to the base rate and reflects a declining charge for use exceeding 450 000 litres per quarter.

This rate structure is typical of municipal water supplies. Historically, major capital expenditures have been subsidized by provincial and federal grants. The rate structure is in step only with operating costs. This reflects the attitude that water is abundant and problems can be readily solved through supply management. No consideration is given to the true cost of providing the service. As a result, the resource is undervalued by the consumer and is wasted. Urbanville is more responsible in this regard than a number of utilities, which do not even meter use, but merely charge a flat rate. Metered users generally use far less water.

The true price of water includes the costs of cleaning up pollution, repairing and upgrading the system, and implementing the watershed management plan, as well as a charge for the use of the resource itself. Realistic pricing tends to encourage greater efficiency of use and hence conservation.

*Step One*

*Overview*

*Identify the need for watershed management.*

Table 1 — Financial Statements

## Revenue Expense (000s)

| | 1992 (actual) | 1993 (actual) | 1994 (estimate) | 1995 (projection) |
|---|---|---|---|---|
| Revenue | 203 | 192 | 192 | 201 |
| Expense | 182 | 177 | 210 | 179 |
| Excess Revenue over Expense | 21 | 15 | (18) | 22 |

| **Capital Estimates** | **1994** | **1995** | **1996** |
|---|---|---|---|
| | 2017 | 2018 | 2019 |
| | 0 | 10,000 | 40,000 |

**Quarterly Rates:** 38.50 domestic
616.00 industrial

**Last increase:** January 1987

Additional revenues generated by the utility include:

- Public Fire Protection Rate, a transfer payment from the county to the utility based on the assessed value of buildings being serviced;
- Sprinkler System Rate;
- rates for hookups to supply vessels, steamers, boats, etc.;
- privately owned hydrants (installed by the larger commercial establishments);
- water supplied by special hookup to buildings under construction;
- special rates for water supplied from hydrants for uses other than fire protection (e.g., swimming pools).

A cursory review of the financial statements of the utility (see Table 1) indicates that in most years it is able to generate a small profit based on revenues. Clearly, this is not true every year as operating costs in 1994 exceeded revenues by $18,000. Furthermore, it is clear that projected revenues will likely not be sufficient to offset estimated capital costs associated with maintenance and expansion of the infrastructure of the utility. Costs associated with implementing a watershed managment plan must also be covered by the utility. The Urbanville Water Utility will require additional revenues in the near future to offset these costs.

## Population Considerations

Most of the population of 600 in the watershed lives in the Lowlands and in communities such as Frankdale, West New Frank, Oliver, and Central New Frank (see Figure I).

The watershed area has been characterized by out-migration for the last 30 years and its remaining population is aging. Approximately 52 per cent of the residents are over 35 years of age. The average household income is less than $24,000 per year.

The watershed area contains approximately 150 homes, 30 barns, 1 church, 1 school, 8 sawmills, 4 community halls, 1 store and gas bar, and 70 other types of building (primarily storage facilities).

## Preliminary Assessment of Constraints and Opportunities

The most obvious existing problem with raw water quality documented in this overview of issues and concerns involves suspended solids in the river. When these levels are high, the water supply pumps are shut off and the community is fed by gravity from the reservoir. These shutdowns occur an average of six times per year and last for an average of two days.

Unfortunately, a senior citizens home was constructed quite near the reservoir and at nearly the same elevation. In order to maintain water pressure in the building the utility cannot take full advantage of the reservoir's total capacity. So, instead of a three-day emergency supply, the reservoir can provide, at the most, for only two days.

Other problems were suspected to be present in the watershed, but their extent and severity could not be determined in the overview. These included:

- possible malfunctioning septic systems;
- possible illegal dumping of wastes near watercourses;
- spills of petrochemicals or household chemical wastes.

Although dramatic growth in population, and related development, is unlikely in the foreseeable future, the water supply is still vulnerable to changes in water quality. Those changes could be caused by point and non-point sources of pollution associated with:

*Step One.*
*Overview.*

*Determine the most appropriate level of management to aim for.*

*Step One.*
*Overview.*

*Determine the most appropriate level of management to aim for.*

- highway or other construction work;
- forestry operations;
- sawmill operations;
- activities associated with residential development;
- agricultural operations.

Several events not related to the weather have affected the operation of the utility. These, along with proposals to construct utitity corridors through the middle of the watershed, have made it clear that some controls are necessary.

The Urbanville Water Utility, recognizing these problems, commissioned a study in 1991 to see if there was an affordable "bricks and mortar solution." This study, *Urbanville Water Supply Systems Facility Improvement*, suggested three alternatives, the third of which would have seen the construction of a second reservoir tank. This alternative was the least expensive of the three, but at $651,000 was considered too expensive to undertake at the time. The real costs of operating and maintaining the system were not being covered by the rates charged, and there was no fund to draw on for capital improvements, infrastructure replacement, or watershed management. This left watershed management as the only other alternative to maintain or improve raw water quality.

Three major issues must be recognized and fully taken into account by a management strategy for the Neil River Watershed.

i) The communities throughout the watershed have evolved in a relatively regulation-free environment, and some new regulations will likely be required.

ii) The actual Village of Urbanville is not located within the Neil River watershed, so that a discrete separation exists between those who benefit from the water supply system and those who would be affected by management controls in the watershed. The people who would benefit most from watershed management controls (i.e., the residents of the Village of Urbanville) would not have their properties directly affected by those controls. Conversely, those who would be affected most by the watershed controls (i.e., the rural residents scattered throughout the watershed) would not enjoy any of the benefits of the water supply system.

iii) The area in general is characterized by an aging population and moderately low family income. Furthermore, as the population ages, a greater percentage will be living on fixed incomes.

## Recommendations on Management Approach

Based on the overview report and recommendations of the municipal planner, the Council for the Municipality of Frontenac voted 15 to 4 to proceed with the study to develop a watershed management strategy for the Neil River.

It was recommended that a management strategy for the Neil River watershed be developed, possibly incorporating a number of the following elements:

- selected acquisition of land;
- public education;
- community consensus on issues, solutions, and costs of implementation;
- co-operative agreements with land owners;
- other mechanisms as considered appropriate.

The development of the strategy was to be based on the overview of the Neil River watershed including:

- existing and potential land use developments;
- demographic characteristics;
- historical problems with the water supply;
- socioeconomic constraints.

In addition to a watershed management strategy, Council requested the water utility to undertake a review of current rate structures to determine a more realistic full-cost price for the water. This was to be carried out parallel to the watershed management strategy, with a view to submitting a brief to the Public Utilities Board (PUB) that would allow the utility to finance any initiatives approved as a result of the management study, such as waste water treatment, land acquisition, emergency response planning.

This pricing review should incorporate the following elements:

- an evaluation of the true cost of water supply and treatment, including operational costs, present and future capital costs, watershed protection, water quality monitoring, and waste water treatment;
- an evaluation of water pricing and financing options;
- recommendations on water pricing policies that embrace demand management principles;
- community incentives for water and energy conservation;
- public education on demand management and conservation.

*Step One*

*Overview*

*Determine the most appropriate level of management to aim for.*

*Step Two*
*Establish Management Team*

*Define the terms of reference for the study and select members for the management team that will supervise the study.*

Once Council had approved the recommendations contained in the overview, the first step involved the organization of a project management team. Membership on the management team required balancing broad representation of affected parties with a manageable number of participants.

## Key Participants

Key participants for the Neil River Watershed Management Team included:

Municipality of Frontenac County Planner

Municipality of Cumerbund County Planner

Village of Urbanville Commission Chairman

Urbanville Water Utility Engineer

Municipality of Frontenac County Councillor

Municipality of Cumerbund County Councillor

Public representative from the community of West New Frank

Public representative from the rural area of the watershed

Public representative from the Village of Urbanville

Representative from the Department of the Environment (ex officio)

Representative from the Department of Health (ex officio)

The management team received technical input on an advisory basis from the provincial government through the Water Resources Branch of the Department of the Environment.

## Terms of Reference

**Purpose of the Study**
The management team was assigned the mandate to review and evaluate alternative options for a comprehensive water supply area management strategy for the Neil River watershed (Village of Urbanville water supply) and to make recommendations on a preferred approach.

**Role of Management Team**
The management team was responsible for overseeing all steps in the process of developing the strategy including the recommendation of a preferred strategy for adoption by the Municipalities of Frontenac and Cumerbund Counties. The team was not expected to undertake data collection or complex data analysis but to perform a management function in the study process.

**Limits of Responsibility**
The management team was responsible for preparing recommendations to council(s) at each step in the process. council(s) reserved the right to make the key decisions at each stage. Municipal councils were not bound by any recommendation made by the management team and reserved the right to reject any, or all, recommendations.

**Limit of Mandate**
The mandate of the management team was considered complete once the preferred option for the strategy had been

*Step Two.*
*Establish Management Team.*

*Define the terms of reference for the study and select members for the management team that will supervise the study.*

*Step Two.*
*Establish Management Team.*

*Define the terms of reference for the study.*

submitted to councils for adoption. The management team was not involved in implementation and monitoring.

It was agreed that, if necessary, the mandate of the management team could be extended by council under one or more of the following scenarios:

i) The preferred strategy required modification before it could be adopted by council.
ii) The preferred strategy was rejected and council requested that the management team work up a new alternative.
iii) Council adopted the preferred option and decided that the existing management team should be responsible for steering the implementation and monitoring process.
iv) Other reasons deemed appropriate by council.

**Chair**
Meetings of the management team were chaired by the Municipality of Frontenac County.

**Administration**
Minutes of all meetings of the management team were recorded by staff of the Municipality of Frontenac County. The management team sought in all cases to make decisions on the basis of consensus. Where consensus could not be reached, a two-thirds majority was required to pass a motion or implement a decision affecting the internal direction of the study. Six team members had to be present at any meeting in order to establish a quorum.

**Consultant and Other Costs**
All consultant contracts were administered through the Municipality of Frontenac County, and the municipality recovered shareable costs from the province.

**Reporting**
The management team made a representative available to attend any meeting of the Frontenac County Municipal Council, the Cumerbund County Municipal Council, or the Urbanville Village Commission at which the watershed management strategy was to be discussed.

The Frontenac County Municipal Council and the Urbanville Village Commission allocated time on a monthly basis to receive written and oral briefs on the status of the study and progress being made.

**Scheduling**
The management team had two years from the point at which approval to proceed with this study was granted in which to submit an interim report outlining the details of its preferred option for a comprehensive water supply area management strategy for the Neil River Watershed.

## Public Participation

The management team was responsible for organizing and implementing the public participation aspects of this study.

Although the management team required the assistance of technical experts in explaining various aspects of the study to the public, they were clearly responsible for the public participation program and acted as the primary information source for interested groups and individuals.

*Step Three*
*Identify issues — concerns and opportunities*

*Identify the full scope of concerns present in the watershed, including both existing and potential concerns*

The initial responsibility of the management team was to identify and document the full range of issues and concerns relevant to the protection of water quality in the Neil River watershed. As will be seen in the discussion below, the management team relied heavily on public consultation to identify and document issues.

## Overview

The assessment of issues and concerns for the Neil River watershed was a complex undertaking requiring input from a broad range of individuals and groups. The process used to identify and prioritize issues was:

Phase 1 The management team reviewed the background data collected in step one and developed a listing of issues and concerns stemming from this data.

Phase 2 The initial listing was presented to the public and a response from concerned individuals and groups was solicited through a specially organized workshop and general public meetings.

Phase 3 The feedback from the workshop and meetings was collated, and a "final" comprehensive listing of all potential issues and concerns was developed.

Phase 4 A matrix approach was used to prioritize the issues identified. The management team was responsible for the final priority ranking of issues but depended heavily on input received through the workshop and the general public meetings. This approach also served to identify data needs and develop a list of data collection requirements.

The end product of this process was a comprehensive report outlining the issues and concerns in the watershed, a table outlining the priority of each issue, and a listing ofdata collection requirements to better quantify and prioritize these issues should it be decided to continue with the planning process.

Each of the phases used in the process of issue identification is presented below, along with examples of the materials used and end products.

*Step Three*

*Identify Issues, Constraints, and Opportunities*

*Identify the full scope of concerns present in the watershed including both existing and potential concerns*

The management team, with input from provincial government staff, reviewed all the background information collected during the overview process. Particular attention was paid to existing and potential land use issues and socio-economic considerations. For example, data on existing land use (see Figure II) helped to narrow down the possible range of land use issues to three main areas: rural/residential development, forestry operations, and agriculture. Several minor areas were also identified, including highway maintenance and construction; spills and accidents on roadways; and road salting. A listing and description of the issues identified by the management team is presented in Table 2.

Table 2 Potential Issues and Concerns — Neil River Watershed

| Issue | Description |
|---|---|
| RESIDENTIAL | |
| Septic systems | Malfunctioning systems could pose a risk of bacterial contamination. |
| Solid waste disposal | Illegal dumping of waste near watercourses could lead to contamination. |
| Spills and accidents | Spills and dumping of household chemicals (cleaning products, motor oil, etc.) could lead to contamination. |
| New construction | Siltation of watercourses could be a problem. |
| Other | Other residential activities (lawn and garden fertilization, use of ATVs, etc) could impact on water quality. |
| AGRICULTURAL | |
| Animal manure | Improper storage and handling of animal wastes could lead to bacteria and nutrient (nitrogen and phosphorus) contamination. |
| Pesticides | Improper use, storage, and handling of pesticides could lead to contamination. |
| Siltation | Tillage and cropping practices that increase the risk of erosion could cause problems with silt entering watercourses. |
| Accidents and spills | The potential exists for spills of pesticides, fuel, and lubricating oils near watercourses, which could cause contamination. |
| FORESTRY | |
| Siltation | Harvesting and forest road construction could cause problems with silt entering watercourses. |
| Pesticides | Improper use, storage, and handling of pesticides could lead to contamination. |
| Accidents and spills | The potential exists for spills of pesticides, fuel, and lubricating oils near watercourses, which could cause contamination. |
| TRANSPORTATION | |
| Spills and accidents | The potential exists for accidents to cause spills of toxic substances (fuel oil, gasoline, etc.) near watercourses, which could cause contamination. |
| Highway construction and maintenance | Highway maintenance and construction could result in silt entering watercourses. |
| Road salting | Salting of roads in winter (particlarly near stream banks and crossings) could lead to elevated sodium and chloride levels. |

**Note:** This table is illustrative only and is not intended as a comprehensive listing of issues for the Neil River Watershed or any other watershed in Nova Scotia.

## Phase Two

On completion of the management team's assessment of the issues and priorities, it was deemed necessary to involve the general public, special interest groups, and industry associations (in particular the Woodlot Producers Association and the local Federation of Agriculture) in the process. The findings of the management team were published in a brief. Copies were circulated to interested individuals and special interest groups known to the management team, and ads in local newspapers informed other citizens of the availability of the report and solicited their input. Following a waiting period, a formal workshop was conducted to evaluate and modify the findings of the management team as expressed in their report. A series of public meetings was also held to discuss the issues more fully.

## Phase Three

The results of the workshop and public meetings were collated by the management team, and a "final" list of issues was developed.

Once the list of issues had been identified, the management team assessed the potential for current impact and future growth in these areas as a basis for establishing a priority ranking of the concerns. Issues were prioritized using a matrix approach. In this method each issue was assigned a rating based on the sum of five components. These were:

- the current extent of the issue
- the current impact (based on available data)
- the anticipated extent
- the anticipated impact
- the potential severity of the impact (from a health or treatment view) if it occurred.

Each component was assigned a value ranging from 0 to 5 ranked as follows:

| | |
|---|---|
| 0 | Not present |
| 1 | Very low |
| 2 | Low |
| 3 | Medium |
| 4 | High |
| 5 | Very high |

*Step Three.*
*Identify Issues, Constraints, and Opportunities.*

*Identify the full scope of concerns present in the watershed, including both existing and potential concerns.*

The total rating value for any issue could range from 0 to 25. The final priority classes were assigned as shown and provided a standardized method for comparing issues. Table 3 outlines the values assigned by the management team for each matrix component and issue.

| | |
|---|---|
| **0- 5** | Very low |
| **6-10** | Low |
| **11-15** | Medium |
| **16-20** | High |
| **21-25** | Very high |

| Issue | Component | Justication | Value |
|---|---|---|---|
| RESIDENTIAL | | | |
| All issues | Current extent[1] | The level of development in the area is low. | (2) |
| | Anticipated extent[2] | Little residential growth is predicted for the area. | (2) |
| Septic systems | Current impact[3] | Low-level bacteria counts have been detected in the river. | (3) |
| | Anticipated impact[4] | If the population grows, the potential for problems increases as the existing system ages. | (4) |
| | Potential severity[5] | Pathogens from malfunctioning systems could pose a significant health risk. | (5) |
| Solid waste disposal | Current impact | A visual assessment of the watershed identified little illegal dumping. | (1) |
| | Anticipated impact | If the population grows, the impact may increase. | (3) |
| | Potential severity | Illegal dumping may cause low-level contamination. | (2) |
| Spills and accidents | Current impact | Little observable change in water quality. | (1) |
| | Anticipated impact | The small size of operational spills would keep their impact low. | (1) |
| | Potential severity | The flow rate of the river system is such that rapid flushing of the contaminant should occur. | (2) |
| New construction | Current impact | Siltation is a problem in the system with house construction being one possible source. | (2) |
| | Anticipated impact | New house construction near main watercourses could add significantly to sediment loading. | (4) |
| | Potential severity | Increased sedment loading will extend the periods during which the plant must be shut down. | (4) |
| Other | Current impact | Little change in water quality has been detected. | (1) |
| | Anticipated impact | With population growth, the potential for contamination increases slightly. | (2) |
| | Potential severity | The flow rate of the river system is such that rapid flushing of the contaminant should occur. | (2) |
| AGRICULTURAL | | | |
| All issues | Current extent | The level of agriculture in the area is low. | (2) |
| | Anticipated extent | The lowlands of the watershed are capable of significantly higher levels of agricultural activity; however, little growth is predicted for the area. | (3) |
| Animal manure | Current impact | Low-level bacteria counts have been detected in the river. | (2) |
| | Anticipated impact | New manure management guidelines and continued construction of environmentally sound manure storage faciltities should reduce the impact. | (1) |
| | Potential severity | Pathogens and nutrient loading from animal waste could pose a significant health risk. | (5) |

| Issue | Component | Justification | Value |
|---|---|---|---|
| Pesticides | Current impact | The forage-based system in the area uses little in the way of pesticides. No evidence of contamination has been found in previous monitoring. | (1) |
| | Anticipated impact | If the amount of agriculture increases, or there is a shift to more annual crop production, the impact could increase. | (2) |
| | Potential severity | While pesticides have been detected in surface waters in some agricultural areas, levels are usually well below drinking water guidelines. A major spill, however, could be serious. | (4) |
| Spills | Current impact | Little observable change in water quality. | (1) |
| | Anticipated impact | If the amount of agriculture increases or there is a shift to more intensive production, the risks of spills will increase. | (2) |
| | Potential severity | A major spill of pesticides could cause extended plant shutdown. | (5) |
| Siltation | Current impact | Siltation is a problem in the system with agricultural operations being one possible source. | (4) |
| | Anticipated impact | Agricultural operations near main watercourses could significantly add to sediment loading. | (4) |
| | Potential severity | Increased sediment loading will extend the periods during which the plant must be shut down. | (4) |
| FORESTRY | | | |
| All issues | Current extent | Forestry is currently the predominant land use in the watershed. | (3) |
| | Anticipated extent | The extent of forestry operations is not expected to change. | (3) |
| Siltation | Current impact | Siltation is a problem in the system, with forestry operations being one possible source; however, due to strict operation guidelines now in place, its effects are expected to be minimal. | (2) |
| | Anticipated impact | Forestry operations near main watercourses could add to sediment loading if guidelines are not strictly applied in future. | (3) |
| | Potential severity | Increased sediment loading will extend the periods during which the plant must be shut down. | (4) |
| Accidents and spills, excluding pesticides | Current impact | Little observable change in water quality. | (1) |
| | Anticipated impact | The small size of operational spills would keep their impact low. | (1) |
| | Potential severity | The flow rate of the river system is such that rapid flushing of the contaminant should occur. | (2) |
| Pesticides | Current extent | Forestry operations are the largest users of land in the watershed. | (4) |
| | Current impact | The noticeable absence of pesticides in the river system indicates that their use in forestry does not appear problematic at this stage. | (1) |
| | Anticipated extent | Pesicides will continue to be used on forested lands over much of the watershed. | (4) |
| | Anticipated impact | With proper storage and handling, it is likely that any risk of contamination of surface waters can be avoided. | (2) |
| | Potential severity | A significant spill or flow of pesticides into the Neil River or one of its tributaries could have serious repercussions for the water supply. | (4) |

Table 3 Assignment of Matrix Values — Neil River Watershed (cont'd)

| Issue | Component | Justification | Value |
|---|---|---|---|
| TRANSPORTATION | | | |
| Spills and accidents | Current extent | Few accidents and spills have been reported in the area. | (2) |
| | Current impact | There is little observable change in water quality. | (1) |
| | Anticipated extent | The relatively large number of river crossings in the road network of the area means the possibility of a major spill or accident is high. | (5) |
| | Anticipated impact | A large spill (i.e., tanker truck load near a watercourse) could have a major impact on water quality. | (5) |
| | Potential severity | A major spill could cause extended plant shutdown. | (5) |
| Highway construction and maintenance | Current extent | Little activity is currently taking place. | (2) |
| | Current impact | Siltation is a problem in the system with highway maintenance being one possible source. | (4) |
| | Anticipated extent | If population growth occurs in the area and the road network ages, construction and maintenance are expected to increase slightly. | (3) |
| | Anticipated impact | Highway construction or maintenance near main watercourses could significantly add to sediment loading if proper care is not taken. | (3) |
| | Potential severity | Increased sediment loading will extend the periods during which the plant must be shut down. | (4) |
| Road salting | Current extent | Relatively small amounts of salt are currently being used in the area. | (1) |
| | Current impact | There is no measurable increase in sodium or chloride levels in the system. | (0) |
| | Anticipated extent | No increase in salt use is anticipated. | (1) |
| | Anticipated impact | Due to the relatively low salt level used in relation to the total flow, the impact is expected to be minimal. | (1) |
| | Potential severity | The flow rate of the river system is such that rapid flushing of any contamination should occur. As well, little health risk is associated with low salt levels. | (1) |

1 Current extent: How widespread is the activity in the watershed?
2 Anticipated extent: How widespread is the activity likely to become in the watershed?
3 Current impact: What is the existing impact of the activity in the watershed?
4 Anticipated impact: How much greater is the impact of the activitiy likely to be in the near future?
5 Potential severity: How severe an impact could an activity potentially have if a major event occurred?

**Note:** This table is illustrative only and is not intended as a comprehensive listing of issues for the Neil River Watershed or any other watershed in Nova Scotia

The reader should note that numerous provincial, federal, and municipal programs are currently in place to minimize or eliminate the risks associated with the impacts identified in this table. Such programs include:

- forest road construction courses
- integrated pest management
- pesticide storage
- manure storage
- soil conservation assistance

For full details on the scope of assistance available, the departments of Natural Resources and Agriculture and Marketing should be consulted.

The matrix table prioritizing the issues developed by the management team from the assigned matrix values is presented in Table 4.

## Phase Four

| Issue | Current Extent | Current Impact | Anticipated Extent | Anticipated Impact | Potential Severity | Total Rating | Priority Rating |
|---|---|---|---|---|---|---|---|
| RESIDENTIAL | | | | | | | |
| Septic systems | 2 | 3 | 2 | 4 | 5 | 16 | High |
| Solid waste disposal | 2 | 1 | 2 | 2 | 2 | 9 | Low |
| Spills and accidents | 2 | 1 | 2 | 1 | 2 | 8 | Low |
| New construction | 2 | 2 | 2 | 4 | 4 | 14 | Medium |
| Other | 2 | 1 | 2 | 2 | 2 | 9 | Low |
| AGRICULTURAL | | | | | | | |
| Animal waste | 2 | 2 | 3 | 1 | 5 | 13 | Medium |
| Pesticides | 2 | 1 | 3 | 2 | 4 | 12 | Medium |
| Spills and accidents | 2 | 1 | 3 | 2 | 5 | 13 | Medium |
| Siltation | 2 | 4 | 3 | 4 | 4 | 17 | High |
| FORESTRY | | | | | | | |
| Siltation | 3 | 2 | 3 | 3 | 4 | 16 | High |
| Accidents and spills | 3 | 1 | 3 | 1 | 2 | 10 | Medium |
| Pesticides | 4 | 1 | 4 | 2 | 4 | 15 | Medium |
| TRANSPORTATION | | | | | | | |
| Spills and accidents | 2 | 1 | 5 | 5 | 5 | 18 | High |
| Highway construction and maintenance | 2 | 4 | 3 | 3 | 4 | 17 | High |
| Road salting | 1 | 0 | 1 | 1 | 1 | 4 | Very low |

**Note:** These tables are for illustrative purposes only and are not intended as a comprehensive listing of data requirements for the Neil River Watershed or any other watershed in Nova Scotia.

IN THE PROCESS OF ASSIGNING MATRIX VALUES, THE MANAGEMENT TEAM, WITH THE ASSISTANCE OF THEIR TECHNICAL TEAM, IDENTIFIED A NUMBER OF GAPS IN THE AVAILABLE DATA AS OUTLINED IN TABLE 5. IT WAS THE CONSENSUS OF THE MANAGEMENT TEAM THAT THESE ITEMS SHOULD BE ADDRESSED AS SOON AS POSSIBLE.

Table 5 Additional Data Needs – Neil River Watershed

| Issue | Data Needed |
|---|---|
| RESIDENTIAL | |
| Septic systems | An assessment of all septic systems located near water courses in the watershed |
| Solid waste disposal | A survey of the watershed to identify existing illegal dumping |
| New construction | An evaluation of the extent and location of new construction |
| AGRICULTURAL | |
| Animal manure | An analysis of existing manure storage and handling facilities within the watershed |
| Pesticides | An assessment of current chemical use, storage, and handling practices within the watershed |
| Siltation | An assessment of the erodability of existing and potential agricultural land (sensitivity analysis) |
| FORESTRY | |
| Siltation | An assessment of the erodability of existing forested land (sensitivity analysis) |
| Pesticides | An assessment of current chemical use, storage, and handling practices in the watershed |
| TRANSPORTATION | |
| Spills and accidents | An evaluation of current emergency response mechanisms in the event of an accident within the watershed |

Based on an assessment of the issues and concerns identified in Step 3, and on discussion with the public, the following goal has been set for watershed management by the management team.

*Step Four.*
*Set Goals and Objectives for Watershed.*

*Set the ultimate goal to be achieved in the watershed through comprehensive watershed management planning.*

## Goal

The goal of the watershed management strategy is to maintain and, where desirable or necessary, improve the quality of the water at the intake, while encouraging the development and continuation of compatible land use and development practices.

## Objectives

To achieve this goal, the following objectives were set:

- Eliminate all point[1] sources and control non-point[2] sources of contaminants in the watershed.
- Establish water quality objectives for the management of the water supply.
- Reduce the frequency of service shutdowns by 50 per cent over five years (e.g., from current average of six per year to three or less).
- Reduce excess consumption.

*Step Four.*
*Set Goals and Objectives for Watershed.*

*Set the ultimate goal to be achieved in the watershed through comprehensive watershed management planning.*

[1]Point sources of pollution refer to very localized, specific sources of contamination, such as a sewer outfall, a manure pile, or a residential construction site.

[2]Non-point sources of pollution refer to broad general sources of contamination, such as surface runoff from large agricultural areas or large forestry operations.

New data collection is an expensive business. In order to minimize costs, new data is considered only once the critical issues in the watershed have been identified and the goals and objectives for the management strategy set. In this way, only those data that are absolutely essential to the goals and objectives of the strategy are collected. This concept must be balanced with the need to identify potential new issues. Effective monitoring programs are critical in this regard.

*Step Two*
*Collect Additional Data*

*Ensure that all the necessary data are required to develop the management strategy is available to the management team.*

## Background

As part of the issue identification process carried out previously, a number of data needs were identified. During the summer of 1992, four projects were undertaken to address these data needs. These were:

- a biophysical land classification of the area (identifying lands sensitive to erosion if disturbed)
- a survey of existing septic systems
- a land management survey of the watershed (see p. 61 for details)
- a review of emergency and spill response procedures.

## Biophysical Classification

The biophysical land classification project for the Neil River Watershed was the most complex (and costly) of the data collection tasks, since it required the expertise of professional consultants who had to be retained on contract. A project proposal and terms of reference for a consultant study were prepared by the management team, with significant input from technical experts from the Nova Scotia Department of Natural Resources. A tentative budget estimate was prepared and submitted to council. Council approved the funds, and the project was tendered for bids. ABC Environmental Consultants were awarded the contract.

Using existing databases (soils, forest cover, land use, etc.) coupled with air photo interpretation and field verification, and under the close supervision of technical staff from the Nova Scotia Department of Natural Resources, the consultants prepared a sensitivity map for the watershed indicating lands in the watershed most susceptible to erosion and most likely to cause contamination of watercourses if disturbed. (A section of this map is shown in Figure IV.) During the process of developing the sensitivity map, the consultants were also able to identify other possible point sources of contamination, including manure piles near streams or tile drainage outlets near important watercourses. These were noted and added to those identified by the student survey.

*Step Five.*
*Collect Additional Data.*

*Ensure that all the necessary data required to develop the management strategy is available to the management team.*

## Septic System Survey

*Step Five.*
*Collect Additional Data.*

*Ensure that all the necessary data required to develop the management strategy is available to the management team.*

A survey of the existing septic systems was conducted by the Nova Scotia Department of Health with assistance from the Municipality of Frontenac and the summer student hired by the water utility. The watershed was found to contain 150 private residences, 6 public buildings (including 4 community halls, 1 school, and 1 church), and 9 small commercial establishments (including 8 sawmills and 1 general store) all of which were served by at least one on-site sewage disposal system. All of the commercial establishments and three of the public buildings had two septic systems.

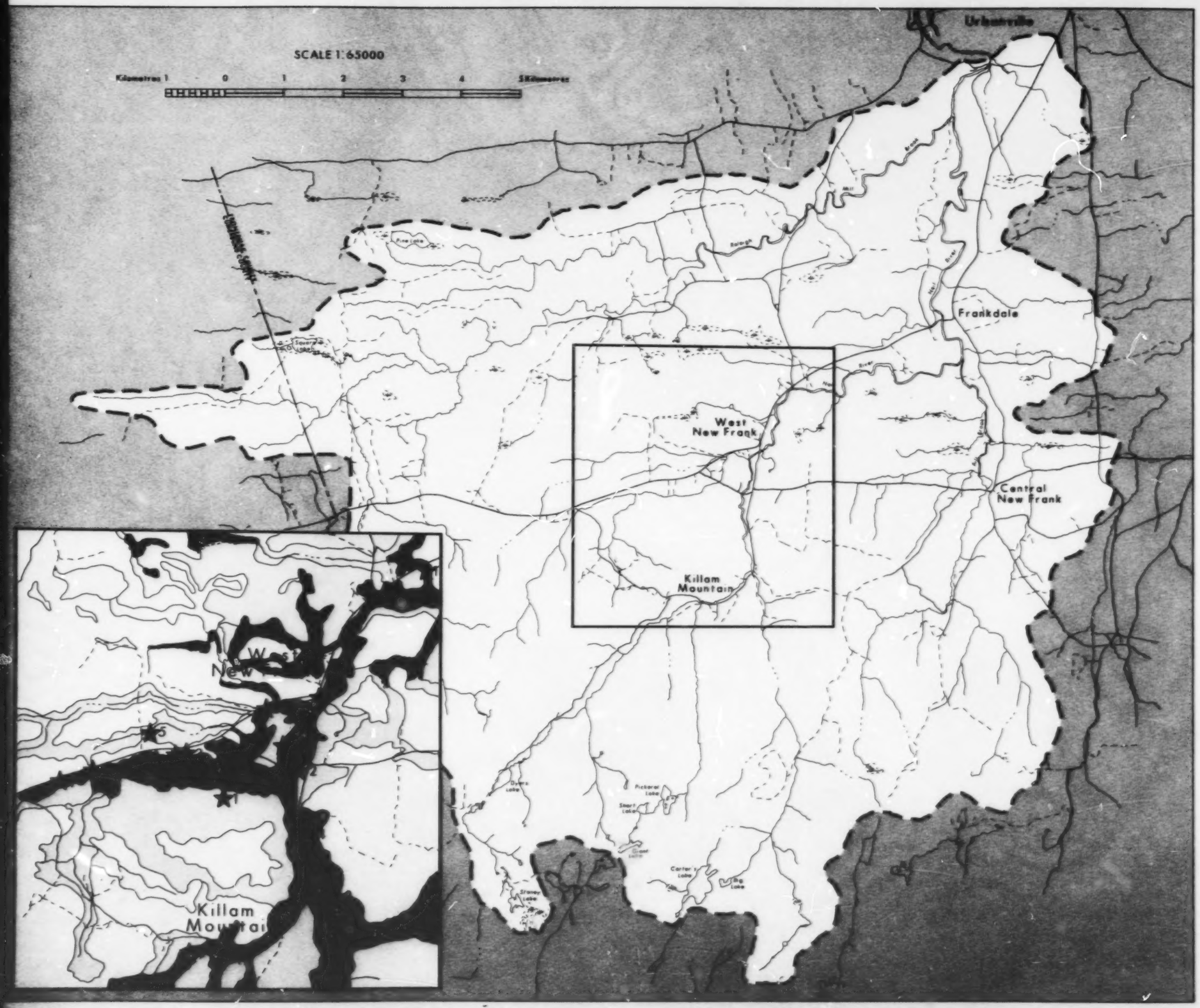
Files at the Department of Health showed that in the last five years only six permits to install on-site sewage disposal systems had been issued. Four of these were to upgrade existing systems that were malfunctioning, and two were due to new construction. It was estimated that 75 per cent of the on-site sewage disposal systems in the area were over 20 years old.

Of the 178 on-site sewage disposal systems, 96 were determined to be close enough to major[1] watercourses (within 150 metres) to have a potentially serious impact on raw water quality if they malfunctioned.

A detailed survey of these 96 systems was conducted during a four-month period over one summer. This survey included a physical assessment of each lot and a dye test of suspected malfunctions.

A total of 45 of the 96 systems were found to be malfunctioning. Of these, 9 involved the discharge of sink wastes only; 21 involved discharge of raw sewage into or near a watercourse; 10 involved the discharge of raw sewage into a highway ditch; and 5 systems had effluent surfacing on the owner's property.

[1] Major watercourses are considered to be those with year-round flow emptying directly into the Neil River and its two main tributaries, the Raleigh Mill Brook and Rill Brook.




Surface Water Supply Watershed for the **Village of Urbanville** 1991

**Land Unit Sensitivity**

*see inset*

Low
- gently sloping
- no direct runoff into water
- few watercourses
- adequate buffer zones around watercourses

Medium
- strongly sloping, hilly
- some direct runoff to watercourses
- barely adequate buffer zones around watercourses

High
- steeply sloping
- direct runoff into watercourses
- major watercourses present
- inadequate buffer zones around watercourses

**Potentially Hazardous Sites**

*see inset*

★ Sites for Purchase
1. erosion with high risk of sedimentation
2. septic system, risk of effluent discharge to stream
3. pesticide/fertilizer discharge from tile drain

★ Sites for Restoration
4. gravel pits in proximity to watercourses

★ Sites for Investigation
5. beaver dam/pond on farmer's field
6. suspected septic system problems

★ Sites for Relocation
7. sawmill sawdust pile in proximity to watercourse
8. manure pile draining through ditch to watercourse

**Source**

Derived from Biophysical Land Classification mapping, N.S. Department of Natural Resources.

**Base**

Derived from 1:10000 Land Registration and Information Service (LRIS) Orthophoto map series. Updated from aerial photography and field checks.

## Land Management Survey

As part of the data collection process, a summer student was hired by the management team (through the water utility). This student was assigned four tasks. These were:

- To conduct a survey of agricultural animal waste and pesticide storage, use, and handling practices in the watershed. This survey was conducted in co-operation with staff from the Department of Agriculture and Marketing.
- To conduct an evaluation of the extent and location of new construction in the watershed. This evaluation was conducted in co-operation with the planning staff of the respective municipalities.
- To conduct a survey of the watershed to identify point sources of contamination including occurrences of illegal dumping.
- To assist staff of the Nova Scotia Department of Health with the survey of on-site sewage disposal systems.

## Agricultural Survey

The survey of agricultural operations used a questionnaire and farm evaluation checklist developed by staff of the Nova Scotia Department of Agriculture and Marketing. The data collected included:

- a description of all farms in the watershed
- an assessment of manure storage, use, and handling practices
- an assessment of pesticide storage, use, and handling practices
- an assessment of cropping practices on the farm.

An overview of the watershed identified 54 farms, distributed as follows: 10 full-time livestock operations; 1 full-time cash crop/vegetable operation; 8 part-time livestock operations; and 5 part-time market garden vegetable operations.

The assessment of manure storage, use, and handling practices was based on the *Guidelines for the Management and Use of Animal Manure in Nova Scotia*, a document published in 1990 by the Nova Scotia Department of Agriculture and Marketing. Of the livestock operations, 3 of the full-time operations and 12 of the part-time operations were found to have inadequate manure storage facilities, with 5 of the manure piles located within 100 metres of major watercourses. However one full-time and two of the part-time operations are building new storage facilities under a

*Step Five.*
*Collect Additional Data.*

*Ensure that all the necessary data required to develop the management strategy is available to the management team.*

*Step Five.*
*Collect Additional Data.*

*Ensure that all the necessary data required to develop the management strategy is available to the management team.*

provincial assistance program. As well, manure-handling practices were found to be inadequate on 3 of the full-time operations and 10 of the part-time operations. The primary handling problem involved the application of manure during the winter to frozen or snow-covered fields.

The assessment of pesticide storage, use, and handling was based on the existing regulations under the Pest Control Products Nova Scotia Act. The survey found that very little pesticide was being used in the watershed. However, storage was a problem on 2 full-time operations and 5 of 20 part-time operations in which pesticides were used. Use and handling of pesticides was found to be adequate on all farms, with the exception of compliance with setbacks from watercourses. Lack of knowledge of the regulations seemed to be the main reason for non-compliance.

Due to the primarily forage-based agriculture in the watershed, improper cropping practices leading to soil erosion were not widespread in the area. This seemed to indicate that sediment runoff from agricultural operations in the area would not be significant.

Using building permits in conjunction with the Land Management Survey, it was determined that new construction was only a small item in the watershed. In the past five years the following construction took place: three new dwellings; seven home extensions; five garages or outbuildings; and one community hall.

It is interesting to note that during this period only two on-site sewage disposal system permits were issued by the Department of Health, so it is possible that one dwelling may have been constructed without such a permit.

Of the 16 new constructions, 8 were located within 100 metres of a watercourse feeding into the Neil River, Raleigh Mill Brook, or Rill Brook. In all cases, no sediment control measures were implemented during construction.

## Point Sources

The survey to identify and map point sources of contamination was conducted in three phases:

- interpretation of air photos (see biophysical classification)
- a vehicular survey (4 x 4) on all passable roads and tracks in the watershed
- a foot survey of stream banks on all major watercourses.

All possible point sources were mapped on air photos and transferred to 1:10,000 paper base maps. In total, the survey identified 49 possible point sources of contamination. These included: 15 illegal dump sites located on or near the banks of major watercourses; 19 on-site sewage disposal systems; 5 farm manure piles; 3 new construction sites; and 7 leaking home oil tanks.

All of these sites had the potential to contribute contaminants to the Neil River, Raleigh Mill Brook, or Rill Brook.

## Review of Emergency Response Procedures

A review of the emergency response provisions for the Neil River Watershed was conducted by the Nova Scotia Department of the Environment in co-operation with local fire brigades; the Royal Canadian Mounted Police; Environment Canada; the Emergency Measures Organization (NS); and the local Emergency Measures Co-ordinator.

This review determined that some emergency response procedures were in place to deal with accidents or spills of toxic or hazardous substances in the watershed. These procedures were assessed by the Nova Scotia Department of the Environment and were found to be inadequate for the protection of this water supply. Equipment was not being maintained, and no one person had been designated as the Emergency Response Team Leader.

*Step Five*
*Collect Additional Data*

*Ensure that all the necessary data required to develop the management strategy is available to the management team.*

*Step Six*
*Evaluate Options*

*Identify the management options that are available and match them to specific issues.*

Matching management options to issues is a critical step in the development of a water supply watershed management strategy. At this stage the management team had to evaluate a range of options for each issue that they intended to address and to select the most appropriate options to proceed with.

During the earlier stages of the study, the management team identified a total of 12 issues or concerns pertaining to the protection of raw water quality in the Neil River Watershed. The criteria outlined below were used to categorize all the issues as either high risk or low risk.

- magnitude of the risk involved in the issue
- scale of the problem: e.g., widespread or local
- nature of risk: e.g., health/aesthetic/industrial
- availability of remedial, mitigative, or preventative measures
- responsiveness of issue to remedial, mitigative, or preventative measures
- cost/benefits
- will to act.

A water supply area management strategy should attempt to deal with all issues. This is not always possible since technological solutions will not be available to resolve some issues, and economic limitations may prevent tackling other issues. The collective public and political will may not be present to address still other issues. Details on the 12 issues, together with the preferred options for dealing with them, are highlighted in Table 6. The full detail of a proposed Emergency Response Plan is outlined in Step 9, Implementation and Monitoring.

| 'referred Option | Key Agency(s) Responsible for Implementing Preferred Option |
|---|---|
| )ption *1, 2,* and *3* in combination — Education and negotiation of co-operative agreements re the preferred options. In the event that these fail, however, critically sensitive portions of ne watershed should be designated under the Water Act and regulations to restrict activities. | Advisory Board/Environment |
| )ptions *1* and *2* in combination — Education and financial incentive programs are the preferred ptions. In the event that these fail, however, critically sensitive portions of the watershed should e designated under the Water Act and regulations developed to restrict activities. | Advisory Board/Environment |
| )ptions *1* and *2* in some combination — Education and financial incentive programs are the preferred ptions. In the event that these fail, however, critically sensitive portions of the watershed should be lesignated under the Water Act and regulations developed to restrict activities. | Advisory Board/Environment |
| )ptions *1* and *2* in some combination — Education and financial incentive programs are the preferred ptions. In the event that these fail, however, critically sensitive portions of the watershed should be lesignated under the Water Act and regulations to restrict activities. | Advisory Board/Environment |
| )ption *3*<br>:ducation and negotiation of co-operative agreements are the preferred options. In the event nat these fail, however, critically sensitive portions of the watershed should be designated under ne Water Act and regulations developed to restrict activities. | Advisory Board/Environment |
| )ptions *1* and *2* in some combination — Education and financial incentive programs are the preferred ptions. In the event that these fail, however, critically sensitive portions of the watershed should be esignated under the Water Act and regulations should be developed to restrict activities. | Advisory Board/Environment |
| )ptions *1, 2,* and *4* in some combination — Education and negotiation of co-operative agreements re the preferred options. In the event that these fail, however, critically sensitve portions of the vatershed should be designated under the Water Act and regulations should be developed to estrict activities. | Advisory Board/Environment |

| General Issue | Specific Issue | Available Options |
|---|---|---|
| | Siltation resulting from road construction | 1) Environmental assessment process<br>2) Education<br>3) Negotiate formal liaison process with Department of Transportation<br>4) Designate under the Water Act. |
| AGRICULTURE | Animal waste | 1) Education<br>2) Financial assistance programs<br>3) Designate portions of the watershed under the Water Act and develop with regulations to establish minimum setbacks from watercourses and minimal standards for management and storage. |
| | Pesticides | 1) Education/training<br>2) Financial assistance for proper storage facilities<br>3) Designate portions of the watershed under the Water Act and develop regulations to establish larger minimum setbacks and other restrictions not possible under the Nova Scotia Pest Control Products Act. |
| | Siltation | 1) Education<br>2) Obtain financial assistance for erosion control structures<br>3) Designate portions of the watershed under the Water Act and develop regulations to control activities within specified setbacks of stream courses. |
| FORESTRY | Siltation | 1) Education<br>2) Apply forest access road construction guidelines and other forestry activities controls as required.<br>3) Develop comprehensive forest management plan.<br>4) Designate portions of the watershed under the Water Act. |
| | Pesticides | 1) Education<br>2) Obtain financial assistance for proper storage facilities<br>3) Designate portions of the watershed under the Water Act and develop regulations to establish minimum setbacks from watercourses and minimal standards for management and storage, etc. |
| TRANSPORTATION | Road salting | 1) Education<br>2) Use alternative de-icing agents<br>3) Designate portions of the watershed under the Water Act and develop regulations to restrict use of salt on highways within specified distance of watercourses, culverts, drainage ditches, etc.<br>4) Establish co-operative information agreements with Department of Transportation on procedures to be followed in road salting in municipal water supply watersheds. |

Following the public review and comment on the management options, the management team began working on the strategy itself. It quickly became obvious that, from the perspectives of both technical and public acceptance, regulatory measures were not appropriate solutions to many of the issues identified. It was also recognized, however, that some regulation would be required in future as the various issues evolve.

The management team also felt that having reviewed public opinion and obtained technical advice, the responsibility of finalizing a management strategy rested with them. A staff member from each of the Municipalities of Cumerbund and Frontenac was seconded for a six-month period to assist in the preparation of the management strategy itself. Large sections of the strategy were already available as working documents.

On March 3, 1994, the final draft of the Neil River Watershed Management Strategy was tabled with the Councils of the Municipalities of Frontenac and Cumerbund. The Table of Contents and an excerpt from that management strategy follow.

*Step Seven*
*Prepare Management Strategy*

*Bring the preferred management options into an integrated, comprehensive management strategy*

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5. IMPLEMENTATION AND MONITORING

## 4.0 Framework for Management

### 4.1 Preface

The preceding evaluations of issues and management options were carried out on a land use basis. Many issues addressed are of concern to more than one sector (e.g., sediment control). Also, the validity and applicability of several management options relate to more than one issue (e.g., education programs and designation under the Water Act).

*The reader should note that only section 4 of the Management Strategy is reproduced here for the sake of example.*

It is the intention, in this and the following sections, to present the preferred management options in an orderly manner. The objective is to outline the management structure that will provide for the maintenance and necessary improvement of water quality in the Neil River. This management structure is based on a specific organization recommendation that will allow for the effective delivery of the necessary programs and planning initiatives. This chapter outlines the recommended framework for future management of the Neil River Watershed.

*Step Seven*
*Prepare Management Strategy*

*Bring the preferred management options into an integrated, comprehensive management strategy*

## 4.2 Organization: Neil River Watershed Advisory Board

Many of the issues to be addressed in the Neil River Watershed are amenable to non regulatory management options, and co-ordination of the efforts of several departments. The municipalities will be required to ensure a comprehensive approach to watershed management and the implementation of the watershed management strategy.

Strong communication links have been established during the preparation of this strategy between different levels of government, the public, and a variety of interest groups. Full advantage should be taken of these improved communications to ensure that co-ordination continues through the implementation phase of the projects.

Watershed Advisory Boards, with representation from the public, government, and private sectors, have proven to be a successful forum for co-ordination in other watersheds in the province. Though these boards do not retain any regulatory authority, they have been very successful in public education, public awareness, and project review. The boards represent and champion the interest of the watershed in a variety of situations.

**Recommendation:**

1) It is recommended that Council establish a Neil River Watershed Advisory Board to be responsible for public education programs and the co-ordination and delivery of programs related to the management and implementation of the watershed management strategy.

This board will liaise with and advise Council and provincial government agencies on matters related to the management of the Neil River Watershed and promote goals and objectives for the management of the watershed.

The Neil River Watershed Advisory Board should be composed of ten members as follows:

- two councillors
- two staff
- one representative of Urbanville
- one representative of the Urbanville Water Utility
- four representatives of the community

Operating expenses for the board will be cost shared by the Municipality, the Water Utility and the provincial government.

*Step Seven*

*Prepare Management Strategy*

*Bring the preferred management options into an integrated, comprehensive management strategy*

## 4.3 Immediate Actions

### 4.3.1 Designation of Portions of the Neil River Watershed under the Water Act

Given the size of the watershed and the dispersed, low-impact nature of most of the issues, it is not appropriate to designate the watershed and regulate activities throughout its entire area. Nevertheless, there are locations within the watershed where some regulation may be required to ensure protection of the water supply. Designation of the watershed would provide a future opportunity to regulate, for example, ATV activity on stream banks or erosion control measures during subdivision or land development. The development of

necessary regulation would be a matter to be dealt with by the Advisory Board, as a part of comprehensive watershed management.

**Recommendation:**

2) It is recommended that the Council of the Municipality of Frontenac request the Minister of the Environment to designate specific portions of the Neil River Watershed as a Protected Watershed under the Water Act.

### 4.3.2 Emergency Response

Spills and accidents can occur at any time, and given the present level of preparedness in the watershed, the safety of the water supply could be jeopardized. An emergency response plan is required immediately to ensure that the consequence of any such spill is minimized.

**Recommendation:**

3) It is recommended that immediate action be taken by the Municipality of Frontenac to implement a contingency plan approved by the Nova Scotia Department of the Environment for the Neil River Watershed.

## 4.4 Programs to Resolve Existing Problems

This group of management options fits into an immediate to medium-range time frame. Many of the programs are in existence and, once implemented, immediate benefits to the watershed will be derived. The nature of certain programs may result in their being extended into the long-range implementation phase of the strategy.

### 4.4.1 Water Quality Monitoring

Water quality data on the watershed is not extensive. In order to determine whether the management programs being applied are effective in meeting their goals and objectives, water quality data are required. These data will also identify future issues or trends of concern.

Water quality objectives for the watershed have been requested. Water quality data are necessary both to set the objective fairly and monitor compliance.

**Recommendation:**

4) It is recommended that a water quality monitoring program approved by the Nova Scotia Department of the Environment be implemented by the Urbanville Water Utility for the purposes of documenting compliance with water quality objectives. Data from this program should be made available to the Department of the Environment and the Neil River Watershed Management Advisory Board to support their efforts in comprehensive watershed management

### 4.2.1 Land Acquisition

This management framework presumes that the majority of issues in the watershed can be addressed through improved co-ordination, communication, and education. The vehicle to achieve this is the Neil River Watershed Management Advisory Board. There is also recognition that limited use of regulation may be required to fully meet the needs of water quality protection. There is also, in the case of those extremely sensitive lands identified as part of the biophysical analysis, a situation in which any disruption

of the soil and vegetation poses a threat to the downstream water quality.

Some of these lands are forested while others are in use for agricultural purposes. The area concerned is small, totalling 220 hectares in the entire watershed. In view of the present and potential risk posed by any activity in these areas, it is most appropriate that they be retained in their natural state or be restricted to limited recreational use as conservation lands. They would serve as a buffer between the various land use activities in the watershed and important watercourses. The severe limitation on use envisioned for these conservation lands places significant constraints on the activities of the property owner. This is not an equitable situation, and therefore a program of land acquisition for conservation purposes is proposed.

Acquisition by the municipality of these extremely sensitive areas should proceed based on the availability of land, funds, and sensitivity and should continue until all the necessary parcels are publicly owned. Funding for this program should be based on cost sharing between the municipality and the utility.

**Recommendation**:

5) It is recommended that the municipality purchase all lands identified as being extremely sensitive to erosion according to the biophysical land classification. Purchase of the lands should be phased, based on available funding, available property, and degree of importance. Funds to support this program should be obtained jointly from the utility and the Councils of

Frontenac (for property in Frontenac) and Cumerbund (for property in Cumberbund).

### 4.4.3 Financial Assistance

Several provincial programs exist that offer financial support to farmers and forestry operators. These programs can be used to encourage management practices that support the objectives of the watershed management plan. Specific examples of these programs include:

- Nova Scotia Department of Agriculture and Marketing: Land Improvement Policy
- Nova Scotia Department of Lands and Forest: Woodlot Improvement Policy

**Recommendation**:

6 a. It is recommended that the Neil River Watershed Advisory Board encourage farmers and forest operators to apply for financial assistance as part of their education program.

b. Further, it is recommended that the Municipality of Frontenac request the Nova Scotia Department of the Environment to encourage the Departments of Natural Resources, and Agriculture and Marketing to continue recognizing the importance of protecting water quality in the Neil River Watershed.

### 4.4.4 Septic Tank Repair and Maintenance

The cost of repairing malfunctioning septic systems in the watershed is estimated at between $150,000 and $250,000. It is anticipated that, as education in the watershed

increases public awareness, the willingness of the residents to manage sewage properly will also increase. In view of the benefits individual residents will obtain frcm improved septic tank management, individuals must bear some of the costs of the repair and ongoing maintenance. The Neil River Watershed Advisory Board should promote this program.

**Recommendation**:

7) It is recommended that funds raised jointly by the utility and municipality be used in support of a phased program of repair for the 45 identified malfunctioning systems. This program should be based on 50 per cent municipal funding to a maximum of $1,500 with support for an interest-free loan to cover the remainder. Further, a program of 50 per cent municipal cost-sharing for septic tank pumping should be instituted for ongoing maintenance.

## 4.5 Long-Range Management Initiatives

The following management initiatives and programs have a long-range perspective. Though work on them can and should begin as soon as possible, few benefits will be obtained from these exercises for a number of years. These initiatives constitute the backbone of preventative management for the future.

### 4.5.1 Education

Education of both the resident watershed population and the consumers is a key feature of this management strategy. Issues in the watershed are generally dispersed, and

relatively low in scale. Adjustment in the attitudes and behaviour of those using the watershed could result in significant long-term benefits in water quality.

Areas requiring educational effort are:

- importance of the resource
- erosion and sedimentation
- septic tank maintenance
- manure storage
- road construction and maintenance
- ATVs and snowmobiles.

*Step Seven*
*Prepare Management Strategy.*

*Bring the preferred management options into an integrated, comprehensive management strategy.*

A comprehensive and sensitive approach to information distribution is required so that there is a general shift in attitude to support the objectives of water quality improvement. The group most able to draw on a wide range of expertise in the area, which is not affiliated to any particular interest, is of course the Neil River Watershed Management Advisory Board. It is to the board that the task of information dissemination will fall.

**Recommendation:**

8) It is recommended that the Neil River Watershed Management Advisory Board develop a comprehensive educational package promoting watershed management and identifying the issues and solutions to these issues. This information should be readily accessible to the residents of the watershed.

*Step Seven:*
*Prepare Management Strategy*

*Bring the preferred management options into an integrated, comprehensive management strategy*

### 4.5.2 Inter-Municipal Planning Strategy and Land Use By-Law

Many benefits can be derived from a successful planning strategy, and some of these benefits would be of great assistance in the longer-term management of the watershed. For example, appropriate setbacks from the watercourses for storage facilities and or residential and commercial structures could be established. Certain land uses that have the potential to pollute or degrade water quality could be prohibited. Efforts to prepare such a strategy could help maintain the excellent communication and co-operation achieved between the municipalities during the preparation of this document.

**Recommendation:**

9) It is recommended that the Municipalities of Cumerbund and Frontenac pursue the preparation of an inter-municipal planning strategy and implement a land use by-law for the Neil River Watershed.

### 4.5.3 Forest Management Strategy

Pursuing a single forest management plan for the watershed has certain short-term disadvantages to the individual land owner. There are, however, significant long-term benefits to the overall resource and to all land owners. Participation in a forest management co-operative that would implement any such plan would provide the added benefits of access to expertise/knowledge and funding for the plan implementation on individual woodlots.

**Recommendation:**

10) It is recommended that the Neil River Watershed Management Advisory Board and the Nova Scotia Department of Natural Resources actively encourage the co-operative to prepare a forest management plan for the watershed and promote water quality protection in all co-op activities.

*Step Seven*
*Prepare Management Strategy.*

*Bring the preferred management options into an integrated, comprehensive management strategy.*

### 4.5.4 Communications

The authority to manage the different issues in the watershed is vested in a variety of agencies: municipal, provincial, and federal. Problems are likely to arise not from an unwillingness to recognize the concerns of water quality, but through a lack of communication.

Strong communications between all levels of government and the public have been established during the development of this strategy. The Neil River Watershed Management Advisory Board is an obvious vehicle to facilitate such communication between government and the public. A formal liaison committee at a provincial level, working with the Neil River Watershed Management Advisory Board, would complete the communication chair.

**Recommendation:**

11) It is recommended that the Neil River Watershed Management Advisory Board be recognized as the co-ordinating advisory vehicle responsible for maintaining communications between all levels of government and the public on matters relating to water quality protection, and that in this regard the Neil River Watershed Management

Advisory Board review and comment on projects, proposals, and policies both public and private initiatives on matters affecting water quality in the Neil River Watershed.

### 4.5.5 Regulations under the Water Act

*Next Steps*
*Prepare Management Strategy*

*Bring the preferred management options into an integrated, comprehensive management strategy.*

In the event that education programs and financial incentives prove inadequate to deal with certain issues, the option to designate under the provincial Water Act is available. Designation is the term applied to the process of watershed identification and protection, and the development of regulations to protect that water resource. These regulations could include standards for forestry or agricultural operations. For those critical areas identified as a protected watershed, such regulations should be considered from the outset. In other situations, changes to the designation due to an increase in concerns would be required.

The Neil River Watershed Management Advisory Board with its connections to both the public and government expertise is the most appropriate forum in which to develop necessary regulations. Examples of regulations for water supply areas currently designated under the Water Act, can be obtained from the Nova Scotia Department of the Environment.

**Recommendation:**

12) It is recommended that the Neil River Watershed Management Advisory Board consider designation under the Water Act with public involvement to address those issues that are of significance and cannot be resolved by another means.

### 4.5.6 Review and Monitoring

This involves continuous monitoring of ongoing concerns and identification of new concerns. It will play an increasingly important role in the management of the watershed as time progresses. Review and monitoring of events in the watershed and of water quality data are necessary to evaluate the success of the management plan, and to determine future directions and changes to current programs, etc.

*Step Seven*
*Prepare Management Strategy.*

*Bring the preferred management options into an integrated, comprehensive management strategy.*

At the end of each fiscal year the effectiveness of the entire management strategy must be re-evaluated, and goals, objectives, and organizational structures reviewed. The results of this review should be reported to the municipal councils for approval and decision.

**Recommendation**:

13) It is recommended that the Neil River Watershed Management Advisory Board continuously monitor activities in the basin and report to the municipalities annually on progress with current management initiatives, new initiatives, and necessary changes in future direction, objectives, and organization.

The following memorandum and appended motion were also tabled with the Municipality of Cumerbund.

**MEMORANDUM**

# MUNICIPALITY OF FRONTENAC

**TO:** Warden and Members of Council

**FROM:** Chairman, Watershed Management Team

**DATE:** February 10, 1994

**RE:** Neil River Watershed Management Strategy

Attached, for your review, is a copy of the Neil River Watershed Management Strategy. This strategy has been prepared by the Watershed Management Team, acting in accordance with the goals and objectives approved by Council on August 3rd 1992. The Management Strategy is necessary to protect this water resource which is the municipal water supply for the Village of Urbanville. This is the final draft of the report and is presented to Council for your approval and adoption.

I will briefly summarize some of the major items considered by members of the Watershed Management Team in preparing this strategy:

a) We are fortunate that conditions within the Neil River Watershed are generally good in that there are few land use activities which threaten the quality of water within the watershed.

b) Given this situation, the team members placed the emphasis of the watershed management strategy on seeking improved interdepartmental and municipal co-ordination and promotion of a public information program. The interdepartmental communication is needed to ensure that all municipal departments are aware of the need to control their activities within the watershed so as not to cause deterioration of water quality. A public informa-

tion program is needed to heighten people's understanding of the need to protect the watershed and avoid activities which could cause environmental damage.

c) The management strategy recommends that Council, over a five-year period, undertake a series of specific programs, as follows all figures quoted are total expenditures over the five-year period:

*Step Eight*
*Adopt Management Strategy*

*Officially adopt the comprehensive management strategy by a motion of the local municipal council*

1) sequential purchase of critical land parcels ($75,000);

2) pump out and repair all malfunctioning septic systems ($200,000);

3) prepare an inter-municipal planning strategy and implementing land use by-law to establish policies of land use ($90,000); and

4) monitor water quality within the watershed at an annual cost of $3,500.

d) In addition, the management strategy recommends that Council request designation under the Water Act for specific portions of the watershed.

In presenting this document, our Committee thinks that we are assisting Council to demonstrate foresight and wisdom in the management of our water resources to serve us and future generations.
Respectfully submitted,

**MOTION OF COUNCIL:**

I, Manny O'Neill, Council Representative on the Neil River Watershed Management Team, move that the Municipal Council of Frontenac adopt the Neil River Watershed Management Strategy as presented to us this evening and further that the Municipality undertake, over the next five years, to: a) designate portions of the watershed under the Water Act; b) attempt to purchase the critical land parcels identified in the report; c) in co-operation with the landowners, establish a program to pump out and repair all malfunctioning septic systems within the watershed area; d) prepare an inter-municipal planning strategy; and e) monitor water quality within the watershed area.

*Step Nine*
*Implement and Monitor*

*Set up procedures for continuous monitoring and updating of the management strategy*

Implementating and monitoring are critical components in the planning process. All elements of a water supply watershed management strategy cannot be implemented simultaneously and therefore must be carefully staged and phased-in over time. Furthermore, many implementing agencies may be involved, requiring careful co-ordination. Finally, no watershed management strategy can be considered static. Circumstances and priorities will change over time, and this necessitates monitoring to ensure all necessary changes in the strategy are made.

## Sequence of Actions (Year 1 [illegible])

### Municipal Actions

1. Establish Neil River Watershed Advisory Board (NRWAB)
2. Request Department of the Environment for (NSDOE) approval
   i) Emergency Response Plan*
   ii) Designation
3. Request funding and public approval for
   i) Septic tank maintenance
   ii) Land acquisition
   iii) Water quality monitoring*
4. Co-operate on Inter-municipal Planning Strategy and Implementing Land Use By-Law
5. Review report on management status
6. Approve recommendations for next five years

### Watershed Advisory Board Actions

1. Develop prospective program review procedure
2. Promote Municipal Planning Strategy and Implementing Land Use By-Law
3. Develop education program
4. Promote forest management
5. Collect information
6. Communicate with NSDOE
   Review proposals
   Solicit support of management strategy
7. Draft regulations
8. Prepare status report

### Department of the Environment Actions

1. Approve Emergency Response Plan
2. Designate watershed
3. Approve Water Quality Monitoring
4. Inform provincial departments of
   Natural Resources,
   Agriculture and Marketing,
   Transportation and Communications
5. Approve regulations

*An example of the plan implemented is attached.

## Neil River Watershed Advisory Board Five-Year Critical Path

| | |
|---|---|
| NRWAB ESTABLISHED | Year 0 |
| Approved Emergency Response Plan in place | |
| Watershed designation in place/agencies informed | |
| NRWAB review procedures in place | |
| Approval from Public Utilities Board/Council on funding | Year 1 |
| Education program developed | |
| Water quality monitoring begins | |
| Aquisition/repair and maintenance of septic tanks under way | |
| Education/information program in place | |
| Preparation of Municipal Planning Strategy (MPS) and Implementing Land Use By-Law (LUB) begins | Year 2 |
| Development of regulations begins | |
| Forest Management Plan promoted | |
| Draft regulations reviewed by public | Year 3 |
| Regulations in effect | |
| MPS/LUB given Council approval | Year 4 |
| MPS/LUB in effect | |
| Begin preparation of status report | |
| Council approves status report | Year 5 |

## Water Quality Monitoring Program

Two key programs were assigned high priority for implementation as soon as the strategy for the Neil River Watershed was adopted. These programs were a Water Quality Monitoring Program and an Emergency Response Plan, which is outlined below.

### Purpose

This program is established to monitor water quality within the Neil River Watershed area upstream from the intake of the municipal water supply system. It is to be implemented in addition to routine sampling of the distribution system by Nova Scotia Department of Health personnel. The samples are taken at the end of the distribution system (i.e., residential taps) on a weekly basis for bacteria, and quarterly for trihalomethanes. Once a year additional samples are taken to determine the general water chemistry, including metals.

This monitoring program is not intended to replace sampling in response to problem situations as they arise, nor to address the monitoring of pesticides. A monitoring program for pesticides would have to be specific to identified applications so as not to be cost prohibitive.

### Sampling Protocol

To provide consistent, representative, and comparable samples for analysis and data for interpretation, any monitoring program must follow protocol established in accordance with standard accepted methods. Sampling protocol is established in the latest edition of *Standard Methods for the Examination of Water and Wastewater*[1], which should be used as a reference. However, a general protocol is provided below in order to illustrate procedures.

**MICROBIOLOGICAL WATER QUALITY (BACTERIA)**

1) **Container**
   a) minimum 250 mL capacity
   b) specially prepared sterile container obtainable from accredited lab
2) **Procedure**
   a) avoid contamination of bottle; keep closed until it is to be filled
   b) sample at location representative of stream flow, usually mid-stream
   c) hold bottle near its base, plunge it, neck downward, below the surface
   d) turn bottle until neck points slightly upward and mouth is directed toward the current to avoid possible contamination from the hand
   e) avoid contact with bank, stream bed, or surface scum to prevent fouling of sample
   f) fill bottle without rinsing, leaving 2.5 cm of air space, and cap tightly.
3) **Parameters**

   Total coliform; fecal coliform

*Step Nine.*
*Implement and Monitor.*

*Set up procedures for continuous monitoring and updating of the management strategy.*

[1] *Standard Methods for the Examination of Water and Wastewater.* American Public Health Association, American Water Works Association, Water Pollution Controls Federation, latest edition.

*Step Nine.*
*Implement and Monitor.*

*Set up procedures for continuous monitoring and updating of the management strategy.*

**CHEMICAL WATER QUALITY**

**1) Container**

a) minimum 500 mL capacity (if a general chemical analysis and metal scan are specified parameters)
b) clean but not necessarily sterile
c) preferably standard bottle obtainable from accredited lab

**2) Procedure**

a) avoid contamination of bottle
b) sample at location representative of stream flow, usually mid-stream and mid-depth, if possible
c) thoroughly rinse bottle and inside of cap
d) avoid contact with bank, stream bed, or surface scum to prevent fouling of sample
e) fill bottle entirely and cap tightly
f) keep sample cool and deliver to lab within 24 hours.

**3) Parameters**

Water samples are to be analyzed for the following parameters:

| | |
|---|---|
| Sodium | Total organic carbon |
| Potassium | |
| Calcium | Iron |
| Magnesium | Manganese |
| Hardness | Copper |
| Alkalinity | Zinc |
| Sulfate | pH |
| Chloride | Colour |
| Silica | Conductivity |
| Nitrate & nitrite | Turbidity |
| | Bicarbonate |
| Ammonia | Carbonate |
| Ortho-phosphate | Saturation pH |
| Langelier Index | Barium |
| | Boron |
| Anion sum | Beryllium |
| Cation sum | Cobalt |
| Ion balance | Chromium |
| Total dissolved solids | Nickel |
| | Antimony |
| Calculated conductivity | Selenium |
| | Tin |
| Fluoride | Vanadium |
| Suspended Solids | |
| Arsenic | |
| Lead | |
| Cadmium | |
| Aluminum | |

SAMPLE IDENTIFICATION

Accompany sample with complete and accurate identifying and descriptive information, including but not limited to:

a) specific location, preferably giving grid reference from a specified map
b) date and time
c) collector's name

SAMPLING STATIONS FOR THE NEIL RIVER WATERSHED

#1 Intake of supply line (wet well)

#2 Rill Brook (at nearest point above confluence with the Neil River that is easily accessible)

#3 Neil River (at nearest point above confluence with Rill Brook that is easily accessible)

#4 Raleigh Mill Brook (at nearest point above confluence with French River that is easily accessible)

Frequency of sample collection has a direct bearing on the adequacy of the monitoring program, especially during establishment of baseline data. Four options for a sampling program are presented in Table 7. Of the four presented, options one or three are considered the preferred.

BASELINE DATA

In addition to the three stream sample stations and the inlet station, it would be beneficial to take at least one sample per year in each of the four headwater lakes in the watershed. These samples should be taken shortly after ice cover is gone in the spring, located at midlake, and at approximately 30 cm below the surface. Parameters for analysis would be included in a general chemical analysis and metal scan.

After a minimum period of one year (but preferably three) data would be sufficient to form a baseline. With this baseline established, sampling parameters could be reduced to those of the "Public Health 9" plus suspended solids.[1]

Options for a water sampling program are contained in Table 7.

[1] The "Public Health 9" consists of nine elements monitored by the Department of Health as an evaluation of water quality: hardness, alkalinity, chloride, sulphate, iron, manganese, pH, ammonia, and nitrate.

Table 7 — Option 1

| Sampling Station | Parameters | Present Cost/Sample | Sampling Frequency | Annual Cost/ Parameter Group | Annual Cost/ Sampling Station |
|---|---|---|---|---|---|
| #1 Intake | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | Monthly | $144.00 | $1,508.00 |
| | *Chemistry*<br>-general analysis<br>- metal scan | $122.00 | Monthly | $1,464.00 | |
| #2 Rill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $584.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $122.00 | 4 times/year minimum** | $488.00 | |
| #3 Neil River | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $584.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $122.00 | 4 times/year minimum** | $488.00 | |
| #4 Raleigh Mill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $584.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $122.00 | 4 times/year minimum** | $488.00 | |
| | | | | **Total Cost** | **$3,260.00*** ** |

* Monthly sampling during ice-free period (April to November)
** Seasonal sampling during ice-free period (April, July, October) and one sample taken after a major rain event
*** Sampling four headwater lakes once per year (April) for general analysis and metal scan would cost an additional $488, for a total annual cost of $3,748.00.

| Sampling Station | Parameters | Present Cost/Sample | Sampling Frequency | Annual Cost/ Parameter Group | Annual Cost/ Sampling Station |
|---|---|---|---|---|---|
| #1 Intake | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $584.00 |
| | *Chemistry*<br>-general analysis<br>- metal scan | $122.00 | 4 times/year minimum** | $488.00 | |
| #2 Rill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $584.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $122.00 | 4 times/year minimum** | $488.00 | |
| #3 Neil River | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $584.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $122.00 | 4 times/year minimum** | $488.00 | |
| #4 Raleigh Mill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $584.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $122.00 | 4 times/year minimum** | $488.00 | |
| | | | | **Total Cost** | **$2,336.00*** ** |

* Monthly sampling during ice-free period (April to November)
** Seasonal sampling during ice-free period (April, July, October) and one sample taken after a major rain event
*** Sampling four headwater lakes once per year (April) for general analysis and metal scan would cost an additional $488.00, for a total annual cost of $2,824.00.

Table 7 [illegible] Option 3

| Sampling Station | Parameters | Present Cost/Sample | Sampling Frequency | Annual Cost/ Parameter Group | Annual Cost/ Sampling Station |
|---|---|---|---|---|---|
| #1 Intake | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | Monthly | $144.00 | $684.00 |
| | *Chemistry*<br>-general analysis<br>- metal scan | $45.00 | Monthly | $540.00 | |
| #2 Rill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $276.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $45.00 | 4 times/year minimum** | $180.00 | |
| #3 Neil River | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $276.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $45.00 | 4 times/year minimum** | $180.00 | |
| #4 Raleigh Mill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $276.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $45.00 | 4 times/year minimum** | $180.00 | |
| | | | | **Total Cost** | **$1,512.00*** ** |

* Monthly sampling during ice-free period (April to November)
** Seasonal sampling during ice-free period (April, July, October) and one sample taken after a major rain event
*** Sampling four headwater lakes once per year (April) for general analysis and metal scan would cost an additional $488, for a total annual cost of $2,000.00.

Table 7 — Option 4

| Sampling Station | Parameters | Present Cost/Sample | Sampling Frequency | Annual Cost/ Parameter Group | Annual Cost/ Sampling Station |
|---|---|---|---|---|---|
| #1 Intake | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $276.00 |
| | *Chemistry*<br>-general analysis<br>- metal scan | $45.00 | 4 times/year minimum** | $180.00 | |
| #2 Rill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $276.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $45.00 | 4 times/year minimum** | $180.00 | |
| #3 Neil River | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $276.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $45.00 | 4 times/year minimum** | $180.00 | |
| #4 Raleigh Mill Brook | *Bacteria*<br>-total coliform<br>-fecal coliform | $12.00 | 8 times/year minimum* | $96.00 | $276.00 |
| | *Chemistry*<br>-general analysis<br>-metal scan | $45.00 | 4 times/year minimum** | $180.00 | |
| | | | | **Total Cost** | **$1,104.00*** ** |

* Monthly sampling during ice-free period (April to November)
** Seasonal sampling during ice-free period (April, July, October) and one sample taken after a major rain event
*** Sampling four headwater lakes once per year (April) for general analysis and metal scan would cost an additional $488.00.

## An Emergency Response Plan

In this example, the Management Strategy for the Neil River Watershed identified an emergency response plan as an immediate requirement. The full text of the plan for the area is presented here in the format required for approval by the Nova Scotia Department of the Environment.

*Step Nine*
*Implement and Monitor*

*Set up procedures for continuous monitoring and updating of the management strategy*

**Environmental Emergency Response Plan**

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## 1. SCOPE

### 1.1 Purpose of the Plan

The purpose of the Neil River Watershed Environmental Emergency Response Plan is to make provision for a rapid, systematic, and effective response to accidental spills of dangerous goods and hazardous wastes and to control the effects of such spills for the protection of the water supply of the Village of Urbanville.

### 1.2 Geographic Location of Where Plan Will Be Operative

This plan is operative within the boundaries of the Neil River Watershed as depicted in Figure 1. The Neil River Watershed extends beyond the boundary of Frontenac County into a small area of Cumerbund County. The Environmental Emergency Response Plan has therefore been adopted through Order-in-Council in both municipalities.

### 1.3 Listing of All Groups That Have Specific Responsibility under the Plan

The following groups have specific responsibilities designated in the plan:

- the Village of Urbanville Water Utility
- the RCMP
- the Urbanville Village Fire Brigade
- the Central Frontenac Fire Brigade
- the West New Frank Fire Brigade
- Regional Office of the Department of the Environment
- Regional Office of the Department of Health
- Local Emergency Measures Organization

## 2. NOTIFICATION PROCEDURES

### 2.1 General

The notification procedure outlined in the plan will be operational 24 hours/day. The plan lists all agencies, groups, etc., that must be called and their telephone numbers.

Police, fire, RCMP, provincial government, county, and village employees shall report any accidents that involve the release of dangerous goods or hazardous wastes anywhere within the boundaries of the Neil River Watershed. All calls should be directed first towards the Village of Urbanville Water Utility 777-7777 and secondly to the Warden of the Municipality of Frontenac; residence - 765-4321; office - 234-5678. In the case of oil spills, also call the emergency oil spill number 1-800-565-1633.

Callers are to be prepared to report:

- the substance, if known, and amount;
- the location of the spill;
- the time of the spill;
- the source of the spill.

### 2.2 Notification List

The following should then receive an advisory of any incidents, as deemed necessary, for additional appropriate response:

| | |
|---|---|
| Village of Urbanville Water Utility | 777-7777 |
| Warden of Municipality of Frontenac | |
| Residence | 765-4321 |
| Office | 234-5678 |
| Local RCMP Detachment | 667-7777 |

| | |
|---|---|
| Department of Health (regional unit) | 676-7777 |
| Department of the Environment (regional unit) | 767-7777 |
| Department of Natural Resources (regional unit) | 776-7777 |
| Department of Transportation and Communications (regional unit) | 666-7777 |
| Local Emergency Measures Organization | 777-6666 |
| Canadian National Railways Accident Prevention and Environmental Protection | 777-6667 |
| Village of Urbanville Fire Brigade | 777-7776 |
| Central Frontenac Fire Brigade | 777-6767 |
| West New Frank Fire Brigade | 777-7666 |
| Environment Canada-Environmental Emergency Division | 426-6200 |
| Central Frontenac Regional Hospital | 777-7667 |
| Mr. Clean Incorporated | 123-4567 |
| Louis's County Ambulance Service | 999-9999 |

*Step Nine*

*Implement and Monitor*

*Set up procedures for continuous monitoring and updating of the management strategy.*

## 3. ROLE OF THE RESPONSE TEAM LEADER

The Warden of the Municipality of Frontenac has been designated as the official Response Team Leader. He will perform or ensure the performance of the following:

1. make any decisions that must be made;
2. authorize the commitment of any resources that may be required;

3. be the focal point for all communication with government personnel;
4. manage and direct the use of resources;
5. act as the focal point for information exchange;
6. ensure the collection of samples of spill; and
7. prepare and submit a report detailing the response when necessary.

The authority of the Response Team Leader, in the context of this Environmental Emergency Response Plan, is limited to the geographic area of the Neil River Watershed. In the event that an emergency occurs that threatens to cross the boundary of the Neil River Watershed into an adjacent watershed, the Response Team Leader will immediately call his counterpart in the adjacent watershed and fully brief him/her on the details of the emergency. In situations where there may not be an Environmental Emergency Response Plan in an adjacent watershed, the Response Team Leader will immediately call the office of the Director of Resource Management and Pollution Control Division of the Department of the Environment and provide a detailed briefing on the nature and character of the emergency. Under no circumstances should the Response Team Leader for the Neil River Watershed Environmental Emergency Response Plan assume responsibility and authority for emergency response in any other watershed for which a plan has not been formulated and for which he/she has not been officially designated.

*Step Nine*
*Implement and Monitor*

*Set up procedures for continuous monitoring and updating of the management strategy.*

## 4. CONTAINMENT AND CLEAN-UP PROCEDURES

### 4.1 Non-Transport-Related Releases

The Municipality of Frontenac staff will have authority to operate three drainage control structures, which will be built for the containment of spills:

1. The Raleigh Mill Brook diversion structure which will be located off Hwy. 229, approximately 3 km south west of the intake for the Village of Urbanville Water Utility.
2. The Rill Brook control gate and diversion structure, which is to be located approximately 0.5 km south of the community of Oliver at the confluence between Rill Brook and the Neil River.
3. On the Neil River approximately 0.5 km northeast of the community of West New Frank.

Observations of discharge of any foreign substance directly into the Neil River, or any of its tributary streams, should be reported to the Village of Urbanville Water Utility 24-hour emergency phone line and to the Warden of the Municipality of Frontenac. Reporting should be automatic regardless of estimated volume of the discharge. The emergency response team leader is always responsible for determining the level of response required.

If the substance being discharged into the Neil River, or its associated tributaries, is petroleum based, industrial or household chemical, animal waste, septic waste, hazardous waste, or undetermined, the following personnel are authorized to operate control gates and diversion structures in advance of the arrival of the water utility and the response team leader:

- police
- fire brigade

Fire brigade personnel observing an oil or gasoline slick should refrain from flushing the products into ditches, stream courses, or storm sewers etc. Every attempt should be made to contain spilled substances and recover them before they can enter any watercourse or sewer system.

*Step Nine*
*Implement and Monitor*

*Set up procedures for continuous monitoring and updating of the management strategy*

The Urbanville Water Utility and the Municipality of Frontenac will maintain oil booms at strategic locations to be located near the water supply intake and at the confluence of the Raleigh Mill Brook and Neil River and the confluence of the Rill Brook and Neil River. All fire brigade personnel in the watershed will be trained in the proper deployment and use of oil booms.

Since problems with high sediment loading have already occurred in the watershed, sediment curtains will be stored at the same locations as the oil booms and will be deployed as required.

Absorbent materials will also be stored at the water intake area, in West New Frank, and Central New Frank for the purposes of emergency use.

Official reports of spills and accidents will include detailed site descriptions indicating expected discharge areas likely to be impacted and key watercourses to be monitored closely (including culverts, catch basins, streams, tributaries, etc.

## 4.2 Transport Releases

In the case of transport-related accidents, it will always be the case that attendance to accident victims and attendance to fires

will take precedence over environmental considerations.

In addition, this response plan will incorporate fully the requirements of paragraph 7.17 (b & d) of the Dangerous Goods Transportation Regulations (Canada) published in 1989.

*Step Nine*
*Implement and Monitor*

*Set up procedures for continuous monitoring and updating of the management strategy*

## 5. RESTORATION OF THE SPILL SITE FOLLOWING A RELEASE TO THE ENVIRONMENT

Every attempt will be made to ensure that the affected site is restored so that it can be safely used for the same purposes as it was prior to the spill. Contaminated sediment will be trucked away to a designated disposal area.

In the case of a spill of carcinogenic chemicals, asphalted areas will be broken up and trucked away to designated disposal sites, and new asphalt will be laid. All such areas will be clearly posted and fenced until such a time as rehabilitation is completed.

Severely eroded areas will be properly prepared and hydro-seeded, depending on the time of the year. In cases where planting may be impossible, temporary diversion terraces or other acceptable forms of temporary surface cover (e.g., straw, slash materials, etc.) will be employed to minimize further erosion and sediment loading in water courses.

## 6. DISPOSAL

Temporary storage facilities for contaminated soil, asphalt, etc. will be constructed on Department of Transportation

and Communications property east of Killam Mountain. Under no circumstances will contaminated materials remain within the watershed for more than six months. Within that time frame they will be delivered to appropriate incineration sites or long-term toxic waste disposal sites elsewhere. All contaminated materials will be transported in closed containers. Under no circumstances are contaminated materials to be transported in open or covered trucks or containers. Once contaminated materials are excavated and placed in containers, they will remain sealed in the same container until they reach their ultimate disposal site. No long-term disposal facility is planned for Frontenac County.

Any movement of containerized contaminants from temporary storage to final storage will not be undertaken without obtaining the necessary approvals from the Departments of Health, Environment, and Transportation and Communications. Furthermore, at least two weeks notice will be given by the transportation company to the local detachment of the RCMP, local fire brigades, and the Warden of the Municipality of Frontenac of the intention to transport contaminated materials out of the area. Included with the notice of transportation will be the ultimate destination, the route through the municipality, and the mode of transportation.

The following waste disposal contractors are recognized by the Municipality of Frontenac and the Village of Urbanville Water Utility:

1. *Environmental Services Ltd.*
   General cleanup contractor with 24-hour response 898-8989

2. *Eco-Cleaners Ltd.*
   Vacuum truck services with 24-hour response 989-9898

## 7. RESOURCES

An inventory of the available resources that will be made available includes the following:

**COUNTERMEASURE EQUIPMENT:**

- three sets of oil boom equipment
- three sets of sediment curtain
- 2 000 bales of straw
- 500 bales of absorbent material
- 25 sealable containers for transporting and storing contaminated waste.
- equipment and materials for hydro-seeding
- diversion structures and control gates

**PERSONNEL**

- 120 registered volunteer workers

**EXPERTISE**

- provincial engineers, health inspectors, hydrologists

**CONTRACTORS**

- *Environmental Services Ltd.*
  General cleanup contractor with 24-hour response 898-8989
- *Eco-Cleaners Ltd.*
  Vacuum truck services with 24-hour response 989-9898

**TREATING AGENTS**

- spills would most likely involve petroleum products therefore absorbents should be available.

**COMMUNICATIONS**

- contacts; priority order in which they should be made and all numbers have been included in plan.

**EMERGENCY INFORMATION SYSTEMS**

- when chemical information is required on an emergency basis the local fire brigades should contact CANUTE.

**PRE-ARRANGED CONTRACTS**

- see contractors above

## 8. PUBLIC RELATIONS

The Municipality of Frontenac and the Village of Urbanville Water Utility will use every means possible to notify and keep the affected public informed of the situation and of remedial action being taken. All official communication will be channeled through the Response Team Leader and may take the form of newspaper releases, radio and television statements, posted notices, or public meetings. A 24-hour hotline will be maintained for use by the public to obtain updated information on the situation and progress being made with remedial action. This will be answered personally during regular office hours and via a taped message (updated daily after 5 pm) during off hours.

## 9. REPORTING

The Response Team Leader will provide, on request, a detailed report of the circumstance to the Nova Scotia Department of the Environment in accordance with their report specifications.

## I TRAINING

Rapid, systematic, effective response to emergency cannot be achieved without some training on the part of all participants in the environmental emergency response process. The Municipality of Frontenac County and the Village of Urbanville Water Utility will send key staff to Moncton, N.B. for a sixth-month intensive training program at the Canada Centre for Training Key Environmental Emergency Response Personnel. These managers and engineers will in turn conduct intensive training programs for all other volunteer emergency response staff back in Nova Scotia. Key staff will return to Moncton every year for a two-week refresher course.

The Response Team Leader in particular will be sent on intensive courses providing training in dealing with high pressure situations in which major decisions (with serious implications) must be made under extremely tight time constraints.

## II EXERCISES AND INVESTIGATIVE FOLLOW-UP

Semi-annual simulated emergencies will be scheduled in order to practise emergency response procedures and make any modifications and improvements that may be necessary. Particular attention will be paid to detected weaknesses in procedure or capa-

bility. Training programs will then be specifically directed towards dealing with those area of weakness. At least one of the annual simulated emergencies will be scheduled without notification, although all participants will be clearly made to understand at the start that the emergency is simulated.

## III MAINTENANCE OF RESPONSE EQUIPMENT

*Step Nine*
*Implement and Monitor*

Monthly inspection and maintenance will be carried out.

*Set up procedures for continuous monitoring and updating of the management strategy*

## IV UPDATING

This will be the responsibility of the Response Team Leader to co-ordinate, although he/she will obviously be heavily dependent on others to do much of the actual work of updating. The entire Environmental Emergency Response Plan will be thoroughly evaluated and modified, if and as required, every two years.

## Legislation

The authority to deal with issues that arise in watershed management is contained in a number of pieces of provincial and federal legislation. These are listed below along with the administering agency and activity controlled.

Of the provincial acts, approximately four are critical to the success of a management plan. These acts are the Water Act, the Planning Act, the Health Act, and the Municipal Act. The federal Fisheries Act is also important.

| Legislation | Department | Activity |
|---|---|---|
| Dangerous Goods & Hazardous Wastes Management Act | Environment | |
| Derelict Vehicles Removal Act | Environment | |
| Forest Enhancement Act | Natural Resources | Determination of riparian strip along water courses in all Crown lands |
| Environmental Protection Act | Environment | |
| Environmental Assessment Act | Environment | |
| Pest Control Products Act | Environment | |
| Water Act | Environment | |
| Well Drilling Act | Environment | |
| Health Act | Health | On-site waste disposal and sewage treatment facilities |
| Ditches & Water Courses Act | Municipal Affairs | Responsibilities regarding ditches and drains in municipalities and towns |
| Municipal Act | Municipal Affairs | Responsibilities and jurisdiction of rural municipality including powers to levy taxes |
| Municipal Grants Act | Municipal Affairs | Provincial funding to municipal units |

| | | |
|---|---|---|
| Planning Act | Municipal Affairs | Provincial and municipal jurisdiction in land use controls and subdivisions, content of a Municipal Planning Strategy and Land Use By-law |
| Towns Act | Municipal Affairs | Responsibilities and jurisdiction of towns including powers to levy taxes |
| Village Services Act | Municipal Affairs | Responsibilities and jurisdiction of Village Commission |
| Public Utilities Board Act | Municipal Affairs | Review and approval of utility service and rates. |
| | For further information in this area a publication entitled *A Guide to Legislation Relevant to Planning in Nova Scotia* (1988) is available from the Nova Scotia Government Bookstore: 1700 Granville Street, PO Box 647, Halifax, NS Phone: (902) 424-7580 | |
| Dangerous Goods Transportation | Transportation & Communications | |
| Off Highways Vehicles Act | Transportation & Communications | |
| Public Highways Act | Transportation & Communications | |

## Canada

| Legislation | Department |
|---|---|
| Canadian Environmental Protection Act | Environment Canada |
| Fisheries Act | Department of Fisheries and Oceans |
| Migratory Birds Convention Act | Environment Canada |
| Navigable Waters Protection Act | Transport Canada |
| Canada Water Act | Environment Canada |
| Environmental Contaminants Act | Environment Canada/Health & Welfare |
| Government Organization Act — Part 1 | Environment Canada |
| Pest Control Products Act | Environment Canada |
| Transport Of Dangerous Goods Act | Transport Canada |

| Programs/Services | Department | Activity |
|---|---|---|
| Sheep Pasture Improvement Program | Agriculture & Marketing | Assists in establishing good fencing |
| Soil and Water Management Program | Agriculture & Marketing | Drainage and ditching component; can reduce surface runoff, i.e., erosion, pesticides, nutrients, etc. |
| Capital Grants Program | Agriculture & Marketing | Assists with construction of pesticide storage facilities |
| Agricultural Streambank Conservation Program | Agriculture & Marketing | Stabilization of eroding streambanks |
| Manure Storage Program | Agriculture & Marketing | Assists with construction of manure storage facilities |
| Farm Pond Program | Agriculture & Marketing | Assists with construction of farm ponds; keeps animals from drinking in streams |
| LEAPS - Land Evaluation & Planning Services | Agriculture & Marketing | On-farm soil mapping and soil management and crop management advisory service |
| Soil Fertility Analysis and Fertilizer Recommendations | Agriculture & Marketing | Ensures optimum fertility program (prevents over fertilization) |
| Extension Services | Agriculture & Marketing | Soil and crop management; weed control; integrated pest management; farm safety; manure management planning |
| Sprayer Certification Program | Agriculture & Marketing | Training of farmers in safe methods of pesticide applications |
| Operation Sprayercheck Program | Agriculture & Marketing | Assistance to farmers in calibrating sprayers |

| Programs/Services | Department |
|---|---|
| Federal Water Policy | Environment Canada |
| Federal Policy on Land Use | Environment Canada |
| Drinking Water Quality Guidelines | Health and Welfare Canada |
| Flood Damage Reduction Program | Environment Canada |
| Area Screening Canada | Treasury Board |
| Federal Land Management Principle | Treasury Board |
| National Agriculture Strategy | Agriculture Canada |
| National Soil Conservation Program | Agriculture Canada |
| National Forest Sector Strategy for Canada | Forestry Canada |
| Federal Water Quality Guidelines | Environment Canada |
| Atlantic Coastal Action Program | Environment Canada |
| Eastern Habitat Joint Venture | Environment Canada |
| Environment Partners Fund | Environment Canada |

## Nova Scotia

| Guidelines | Department | Activity |
|---|---|---|
| Manure Management Guidelines 1990 | Agriculture & Marketing | To encourage best management practices with storage and use of animal wastes. |
| Environmental Standards for Lands and Forests - the Construction of Forest Access Roads and Fire Ponds in Nova Scotia | Natural Resources | To minimize siltation of water courses as a result of construction activities |
| Forest/Wildlife Guidelines and Standards for Nova Scotia | Natural Resources | To minimize water quality impacts that could negatively affect wildlife habitat |